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American Forestry

OCTOBER · · · · · · · · · · 1911

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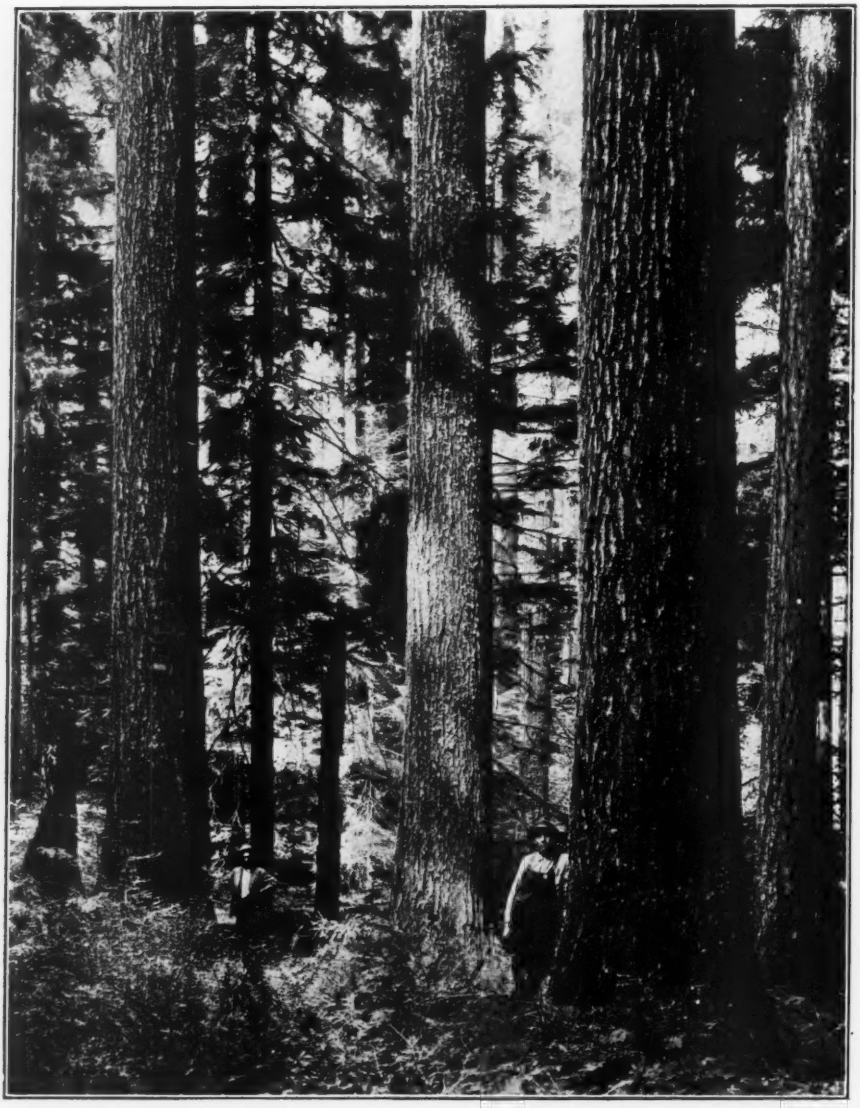

DOUGLAS FIR IN OREGON

THE ONLY ENEMY OF OREGON'S MAGNIFICENT FIR FORESTS IS FIRE

American Forestry

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FIRE PROTECTION IN THE NATIONAL FORESTS

By EARLE H. CLAPP.

EDITOR'S NOTE.—*The conditions and methods of fire protective work in the national forests are clearly set forth in Mr. Clapp's article, which will be concluded next month with consideration of the topics of equipment, organization, patrol, and fighting fires.*

PROTECTION from fire is absolutely necessary to the successful practice of forestry. On the national forests protection is exceedingly difficult because of the long dry seasons which are almost invariably periods of high winds, and because the national forests are stocked almost entirely with coniferous species and in general are located in the mountainous, most inaccessible, and most sparsely settled parts of the west.

The first important work after the transfer of the national forests from the Department of the Interior to the Department of Agriculture in February, 1905, was the completion of the administrative organization begun in the General Land Office. The number of men available for administration and protection was at first comparatively small and each man had to cover an immense area. Most of the men were comparatively inexperienced; for fire fighting they were poorly equipped. Public sentiment regarding protection from fire was often indifferent, and in many localities even hostile. Gradually, however, the number of men available for administrative purposes has been increased; they have become more thoroughly trained for their duties, and have been better equipped. Public sentiment became more and more favorable. It has been possible gradually without doing away with the feeling of individual responsibility among the men, to give in more detail and to make more directly applicable to local conditions instructions for fire protection which necessarily at the beginning were confined to statements of broad principles.

The basic principles for fire protection which are being adopted are simple and provide that protection shall be given according to the value of the material to be protected either for market purposes or watershed protection, and the degree of risk. The degree of risk depends not only on the number of fires, but the damage which will be done by fire. In addition the following essentials from the standpoint of administration are recognized: First, to prevent fires where this is possible; and second, if prevention is impossible to discover fires promptly, to get to them in the shortest possible time with enough trained men suitably equipped to extinguish them without appreciable

damage and at reasonable cost. In order to protect the forest from fires in accordance with these basic principles, and to attain these administrative essentials, the need for systematic effort and for team work to replace individual and disconnected efforts has become more and more apparent. It is recognized that so far as possible, all needs and emergencies to the full extent that men and money are available, must be foreseen and provided for. In this way the greatest efficiency can be secured at the least cost.

FIRE PLANS.

The feeling is growing that systematic protection can be brought about only by a fire plan for each administrative unit or national forest. Each fire plan is now or will eventually become a part of the forest working plan which covers all phases of administration and management.

Fire plans have already been prepared wholly or in part, and are now in effect on a large number of national forests. In each case these plans are based on a careful study which is still being continued and a local application of the principles and essentials already outlined. In addition to the determination of the comparative value of the forest areas to be protected, such areas are being located and mapped as fast as available funds will allow. Studies are being made of the causes and location of all past fires on each forest. Methods are being devised for the prevention of fires so far as this is possible, and studies made to determine on the ground by the men concerned the manner in which patrol should be conducted in order that fires may be discovered quickly. The best form of co-operation between adjoining districts and between adjoining national forests, both in patrol and in fighting fires, is being investigated. Various schemes are being tried experimentally to establish an exceedingly flexible force of forest patrolmen, and in case of need, fire fighters. Various plans are also being tried for rapid transportation of men with equipment and supplies to fires. Plans for permanent improvements, including the building of headquarters for officers; pastures in order that horses may be obtained quickly and easily; telephones and signal systems for prompt communication; roads and trails for easy transportation; lookout stations on prominent peaks which overlook large areas of forest land; tool boxes for the storing of tools at strategic points, have been largely completed and take into account the necessity, so far as the needs can be foreseen, for intensive fire protection. The plans which are based on such investigations and experiments must first of all provide for protection from fire, but must also co-ordinate protection work with the administration work which is to be carried on during the fire season. Experience has shown that each plan must be adapted to the conditions on the ground; that it must be exceedingly flexible to suit changed conditions and to cover all possible emergencies. In order to be successful, it must establish definitely in as much detail as possible the responsibility of all the men concerned without making them feel that the initiative in many phases of the work is being taken from them. The most successful plans will obviously be those which are most complete, most simple and most usable. Finally, provision must be made for constant improvement in prevention and actual fire fighting in accordance with experience and the results of investigations.

Maps usually form a part of the plan and show the location of timber, all permanent improvements which may be of value in fire protection, all particularly dangerous zones, tool caches, ranches where supplies or men may be obtained, roads, trails, telephone lines, etc., topography and any other features which can be placed upon a map and which will be of value in fire protection.

While the following discussion includes questions which must be considered in the preparation of fire plans, it will be obvious that many of the points mentioned can not be included.

VALUE OF MATERIAL AND RISK.

The practice in the Forest Service has not become very definite in regard to the effect which the value of the material and the fire risk should have in protection. In a district embracing in part Montana and northern Idaho an attempt has been made to place the protection in the western part of the district as compared with the eastern in the ratio of 3 to 1, because of the dense stand of western white pine in the west as compared with the lighter open stand of western yellow pine in the east. On individual forests in general, heavy stands of timber and those stands of timber which are in the greatest danger from fire, receive much more protection and are considered first in the location and building of permanent improvements, necessary for efficient fire protection.

CAUSES AND PREVENTION.

The following table shows the number of fires which have occurred on the national forests from 1906 to 1910 inclusive, and also the causes:

Number of Fires in 1906, 1907, 1908, 1909 and 1910, and Reported Causes; Also Percentage of Causes to Total Number of Fires

	1906		1907		1908		1909		1910		Total for the years 1906 to 1910 inclusive	
Causes	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
Locomotives	303	26.7	273	20.1	603	22.1	1,186	37.8	1,704	32.8	4,069	30.0
Lightning	261	23.0	176	13.0	555	20.3	294	9.4	724	14.0	2,010	14.8
Incendiary	24	2.1	19	1.4	102	3.7	97	3.1	302	5.8	544	4.0
Brush Burning	15	1.3	34	2.5	68	2.5	181	5.8	307	5.8	605	4.5
Campers	312	27.5	361	26.7	493	18.1	431	13.7	688	13.2	2,285	16.9
Sawmills and donkey engines	---	---	65	4.8	5	.2	38	1.2	51	1.0	159	1.2
Unknown	196	17.3	367	27.1	263	9.7	758	24.1	1,184	22.8	2,768	20.4
Miscellaneous	22	2.1	60	4.4	639	23.4	153	4.9	241	4.6	1,115	8.2
Total	1,133		1,355		2,728		3,138		5,201		13,555	

The area in national forests has increased from approximately 107,000,000 acres in 1906 to a little more than 190,600,000 acres at the present time. During these five years a regular field force, which has increased from approximately 1,000 in 1906 to approximately 2,500 in 1910, and which has been augmented by other labor when necessary, has extinguished a grand total of 13,533 fires.

With the exception of those started by lightning, which approximate about 15 per cent of the total, all these fires are preventable. In many parts of the west electrical storms during certain parts of the year which are accompanied by little or no rain are very dangerous. For instance, one storm on the Rainier Forest on July 14, 1911, started no less than twenty fires. Fortunately, however, many of these fires went out and the others, with one exception, were reached and put out by rangers before they attained serious proportions. It has been found that in some forests the danger of fire from electric storms is confined to more or less definite zones, and the recognition if this fact is of great value in protection. For instance, on the Payette Forest in Idaho there is great danger from fires started by lightning on only three peaks.

Of the preventable fires the railroads are responsible for by far the largest percentage. Although the mileage of railroad within the national forests is comparatively small, during a period of five years 4,069 fires, or 30 per cent of the total number on the national forests have been set by locomotives. Railroad companies building new lines are in general required to clear and keep clear from all inflammable material their rights of way and an additional strip of sufficient width to prevent the setting of fires under ordinary conditions; to notify forest officers in case fires are set; to furnish section hands for assistance in fighting fires along the right of way or for which the company is responsible; to use oil for fuel or equip locomotives with suitable spark arresters. A number of railroad companies whose lines were constructed before the forests were created, are co-operating with the Forest Service along much the same lines, and efforts are being made to secure co-operative agreements with others.

It is estimated that more than 400,000 people visit the national forests for recreation each year, and carelessness on the part of a small percentage has been responsible for 2,285 fires in five years, or nearly 17 per cent of the total.

The most effective method of checking these people and those who are responsible for the brush burning, incendiary, and other preventable fires, is by education.

EDUCATION.

The educational work of the Forest Service in regard to fires has included chiefly attempts to show the extent of the damage caused, to encourage prevention of fires where possible, and to encourage efforts to extinguish fires which start. Local forest officers embrace every opportunity, especially just before and during the fire season, to confer with forest users and residents in the forest and secure their interest and co-operation in fire protection. In addition patrolmen during the entire season try to see all campers, hunters and other transients who may be on the forests, inform them tactfully of the best methods for handling and the care necessary with camp fires, and if necessary inform them of the federal and state laws for fire protection and the penalties for their violation. In addition to personal conferences fire warning notices of various kinds are posted in conspicuous places in the forests, at post offices, stores, and public places. These notices, which are of several forms, call attention to the fire laws, the penalties for violation of the laws, the rewards which are offered for the arrest and conviction of offenders, and give the names and addresses of forest officers who should be notified if fires are discovered, and finally direct transients to good camping sites, which in many cases are kept sufficiently clear of debris and inflammable material, so that the danger from fire is slight.

Many district foresters and forest supervisors have adopted the plan of writing each year to people who should be interested in fire protection, including forest users and residents in or near the forests, asking their co-operation; to ministers, asking them to bring to the attention of their congregations the importance of fire protection from the standpoint of the public welfare; to editors asking for their influence in stimulating public interest, and to the proprietors of summer resorts, asking them to assist in order to preserve the scenic beauty of the forests. Editors or others whose influence is great, and who question the value of fire protection, are sometimes urged to accompany forest officers and to study fire damages on the ground. Public meetings for the discussion of fire protection are valuable and have accomplished much. Important results have been, and are being, secured by civil and criminal

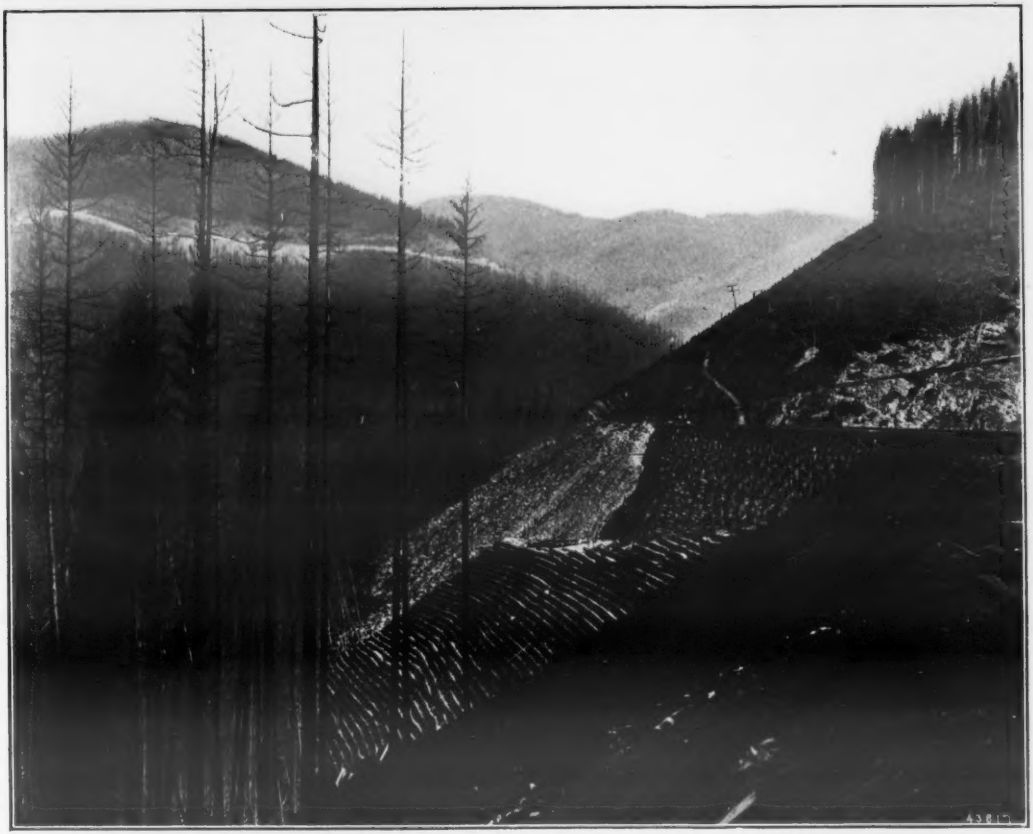
FIRE PROTECTION IN NATIONAL FORESTS

BURNED TIMBER, LOLO NATIONAL FOREST, MONTANA. YOUNG YELLOW PINE AND RED FIR KILLED; ALL VEGETATION AND HUMUS BURNED OUT OF THE SOIL

EFFECT OF HIGH WIND AND FIRE ON A HEAVY STAND OF WESTERN PINE IN THE COEUR D'ALENE NATIONAL FOREST

FIRE PROTECTION IN NATIONAL FORESTS

GETTING TOOLS FOR FIGHTING FIRE. ARAPAHO NATIONAL FOREST



FIRE PROTECTION IN NATIONAL FORESTS

HOW RAILROAD RIGHTS ARE CLEARED FOR PROTECTION. LOOP IN MILWAUKEE ROAD ON NORTH FORK OF ST. JOE RIVER, COEUR D'ALENE NATIONAL FOREST, IDAHO

FIRE RUNNING IN UNDERBRUSH, UMATILLA NATIONAL FOREST, OREGON

FIRE PROTECTION IN NATIONAL FORESTS

TRENCHING FOR BACK-FIRE TO SAVE BUILDINGS. FIRE REACHING TRENCH BEFORE BACK-FIRE COULD BE STARTED

prosecutions for violation of federal and state fire laws. The idea that forest fires could not be extinguished has largely been dispelled and a vast amount of good accomplished by the actual fire fighting in which forest users and residents in and near the national forests have engaged, and many people who in years past have been careless about fires, now realize the damage caused by fires and from experience the hard work necessary to extinguish them.

CO-OPERATION.

Before the creation of the national forests little or no effort was made in the states in which there are now national forests, either to prevent or extinguish fires. One result of the protection in the forests and the educational activities of the Forest Service has been to interest the states and lumbermen's associations, and indirectly to encourage the formation of associations for fire protection. The Service has constantly endeavored to cooperate with all such organizations. At the present time Washington, Oregon, Idaho, and Montana are taking an active interest in fire protection, and are co-operating with the Forest Service.

This cooperation usually provides for such an arrangement of patrol as to prevent needless duplication, for mutual notification in case of fire, for the division of the cost of fighting fires in accordance with the acreage burned over under each jurisdiction, for the appointment of federal officers as state wardens without salary in order that they may assist in the enforcement of state laws, and the appointment of state officers as federal guards at a nominal salary in order that they may have the authority of federal officers on lands belonging to the United States.

A number of fire associations in the states named and composed largely of lumbermen, are cooperating in a similar way. In a large number of cases in addition, there is very helpful cooperation from the owners of timberlands, frequently in the form outlined under cooperation with states. In the case of small holdings it may not, however, go further than mutual notification of fires, and assistance in case the holdings of either party to the agreement are threatened.

The cooperation secured with railroads because they are responsible for 30 per cent of the fires on the forests has already been mentioned.

Further cooperation of great benefit is the assistance given by people regardless of their own immediate interest in the national forests, from the standpoint of the protection of public interests. This cooperation usually takes the form of notification of fires to forest officers, and assistance in fighting fires when help is needed. A more infrequent form of cooperation is in effect during the present season on the Sierra National Forest. A stage company which operates over fifty miles of road within the forest on every day except Sunday, notifies forest officers of fires and provides an efficient patrol through a dangerous country in addition to the regular patrol.

PERMANENT IMPROVEMENTS.

Protection from fire on the large areas included in the national forests can never become thoroughly effective until suitable means of communication and transportation have been constructed, and properly located headquarters for forest officers have been provided. This system of improvements must eventually include extensive fire lines similar to those which have such a great value in the European forests. Practically every forest now has a permanent improvement plan showing as far in advance as the needs can be foreseen, improvements necessary for fire protection, and for every other

form of administration. For fire protection the means of communication and transportation are probably of the greatest importance under present conditions. For communication the telephone is most important and the time it saves is easier to comprehend when it is realized that in some cases mail service from New York to San Francisco is as quick as from a supervisor to a ranger, and in many cases it is several days hard riding from the headquarters to the more inaccessible parts of the forest. Up to June 30, 1910, something over 6,600 miles of telephone lines had been constructed for the Forest Service, at the rate of approximately 2,000 miles per year during the last three years. During the year ending June 30, 1911, the amount of telephone construction was considerably in excess of 2,000 miles. In the more accessible forests there are available many miles of privately owned lines. In addition the Forest Service has cooperated in the building of the new lines, exchanging telephone poles and a free right of way for the free use of the line for official business. The benefits of telephone lines in ordinary administration, and particularly in protection from fire, are incalculable, and have already saved many times over to the people of the United States the money expended in their construction. As a temporary expedient other means of communication, of which the heliograph is probably the most important, have been tried to some extent. There are, however, grave objections to the heliograph. It cannot be used at night or when the atmosphere is too smoky and the need for it may be the greatest. It is often difficult to obtain men who are familiar with the Morse code. It is reasonable to suppose, therefore, that it will gradually be replaced by the telephone, except under unusual circumstances.

Since the mileage of railroad within the national forests is small, transportation must be almost entirely over roads and trails. Thousands of miles of roads constructed by individuals, counties, and corporations existed before the forests. The Forest Service has cooperated with counties in road building by allowing the free use of timber necessary for road construction and by actual work. Many miles of roads have been constructed to market timber purchased and in connection with other uses of the forests. In addition the Service had before July 30, 1910, constructed in excess of 1,200 miles of roads and 13,600 miles of trails. Trails were constructed during the three years preceding June 30, 1910, at an annual rate of about 2,300 miles.

It has sometimes been found advisable in order to secure maximum present benefits from comparatively small sums of money merely to locate, blaze and post the trails, clear sufficiently for travel, and plan for their improvement and completion at a later date. Large areas have thus without delay been made comparatively accessible to patrolmen and fire fighting crews.

The rather diversified objects of trail making, and the same conditions hold more or less true of roads also, are to allow forest officers to get from one place to another by the easiest route and that which is shortest in time; to make possible effective patrol, for which trails necessarily follow the high ridges, extend to prominent peaks suitable for lookouts, and to openings from which good views can be obtained; to so locate and construct trails that in strategic places they may be valuable for fire lines; and to provide for ready access to large bodies of valuable timber in remote and comparatively inaccessible regions. A fire on the Lolo National Forest during the year 1910, in which, for a successful attack, it was absolutely necessary to build 32 miles of trail, illustrates the importance of trails for fire protection.

Before June 30, 1910, more than 1,000 headquarters for forest officers had been built and 247 purchased thereby placing a large number of men in

good locations for administrative work and incidentally for fire protection. Many of these have already, and eventually many more will be connected with the supervisor's office by telephone. Pastures have been fenced at practically all of the headquarters, so that horses are easily available in case of need, and similar pastures at many strategic points throughout the mountains are a great convenience in patrol and fighting fires.

An exceedingly important form of permanent improvement work which has been done largely during the past two years, is the construction of lookout stations on commanding peaks. The amount of work necessary varies greatly and may be no more than the lopping or cutting of a few trees which hide the view, or the fastening of spikes or steps to a tree trunk for a ladder. The more elaborate fire towers or lookout towers consist either of wooden or steel towers of varying height according to the need. The equipment of lookout stations also varies greatly, from the naked eye of the patrolman to an elaborate range finding apparatus on the Arkansas National Forest where, by a system of accurately placed and numbered wires, it is possible by triangulation and specially prepared maps to locate fires within comparatively small areas. Other stations are provided only with a map which may or may not be oriented, or a compass.

During the last two years a large number of tool boxes have been placed at strategic points through the forests. Obviously the judicious distribution of sufficient quantities of the proper kind of tools saves an enormous amount of time in getting to fires.

Very little work has been done by the Forest Service in the construction of fire lines, chiefly because of the immense area under administration and the great cost of construction, and up-keep of any adequate system. Something, however, has been done by cooperation in southern California where watershed protection is so vital to the interests of the fruit growers. To a small extent simple and cheap fire lines, often little more than the burning of brush and other inflammable material, have been constructed around dangerous areas of slash. Roads and trails often serve as fire lines, as does also the work which railroad companies are doing on their rights of way.

In order that the fire menace may not be increased by the cutting of timber, every timber sale contract approved in the Forest Service provides for some disposal of the brush and debris from the cutting. Where there is very little danger from fire and it is silviculturally advisable, limbs are frequently lopped so as to lie close to the ground and decay in the shortest possible time. Where, however, the danger from fire is great, purchasers are usually required to pile the brush so that it may be burned easily and without damage to the remaining stand. Some contracts provide also that standing dead trees shall be cut even though it is almost certain that the stub does not contain merchantable timber. This is advisable because of the fact that burning stubs scatter sparks badly. It has been found on one of the forests in the southwest that the cutting of dead stubs does not cost more than 2½ cents per thousand feet board measure for the timber actually removed. The burning of brush by the Forest Service is usually inexpensive, and in one case in a yellow pine stand on a southwestern forest, cost only 3½ cents per thousand feet board measure. In the heavy Douglas fir in the northwest where it is necessary to cut almost clean, temporary fire lines have been constructed around the sale area and any trees that may be left and the slash has been burned. This burning of the brush and consequent exposure of the mineral soil produces conditions favorable to the reproduction of the desirable Douglas fir, rather than the comparatively undesirable species.

Minor improvements are the development of water where it may be of assistance for administrative purposes, and hence for fire protection and on a few forests, the improvement of camping places in such a way that they will be attractive to transients, and at the same time will reduce the menace from fire.

(This article will be concluded in November.)

WHAT OREGON IS DOING TO PREVENT FOREST FIRES

By C. S. CHAPMAN,

Secretary and Manager, Oregon Forest Fire Association

OREGON, the greatest timber state in the union, with one-fifth of all the standing timber in the United States, has been among the last to adopt progressive measures for preventing destruction through forest fires. That this trouble is being speedily remedied, however, is strikingly shown by the record made up to the present writing, for though 1911 has seen many fires and those of the latter part of August have been serious, in no case has there been failure to promptly attack them, and in few instances has serious damage to green timber resulted.

Contrary to the opinion of many people, Oregon has not for some years past been a state absolutely lacking in forest fire protection. Private owners in no small numbers can point with pride to the fact that as a result of careful patrol and readiness to spend any amount necessary for fire fighting, they have never sustained any loss through fire. Others, however, can boast of no such record, for until the past two years large areas existed, scattered through the state, where no patrols were maintained, on which fires gathered such headway as to prevent their control when they reached points where the careful owner had provided protection in an endeavor to save his own timber. These gaps have now been closed to a large extent, though not all of the state is yet adequately protected.

With a view to securing better protection, and at the same time save the trouble involved in maintaining individual patrols, Oregon timber owners two years ago started a movement to form cooperative patrols. This plan had worked well in Washington and Idaho. It not only allows any owner to share in the expense of looking after the timber, no matter how small his holdings, but the wardens over a wide territory being distributed through one agency does away with duplication of effort, and consequently the maximum protection at the minimum cost is secured.

Under this plan the question of insurance also comes in advantageously. If owners over a large territory agree, in addition to patrolling the land, to jointly fight all fires which occur, it is certain that no heavy burden of expense will fall on one company or individual in any one year. The plan comes as near to giving insurance on timber as any that can be arrived at.

A number of good cooperative patrols are now working successfully in the state. Notable among these is the Coos County Patrol Association, covering all of Coos and portions of Curry and Douglas Counties. The Klamath-

Lake Counties Patrol Association, confined to these two counties, also has an enviable record for achievement. There are also cooperative patrols in Polk, Jackson and Lane Counties, all doing excellent work. Under informal agreements between owners in the same locality, cooperation on a less extensive scale is also practiced; while in many other cases individual owners have their lands patrolled.

In the aggregate there are 350 men patrolling Oregon's timber lands outside the national forests. The state has about 60 wardens in the field, and all that is now lacking to give the state the most complete protection is a thorough organization of all forces so that lost motion will be eliminated. To bring this about is one of the aims of the Oregon Forest Fire Association, for it must be acknowledged that the serious losses of last year can be traced quite as directly to lack of organization in protective work as to lack of patrolmen. This Association, started two years ago, now represents approximately two million acres of the heaviest timber in the state. It has for its object the encouragement and betterment of patrol, and educational work looking to a better and more general understanding of what Oregon's timber resource means to citizens of the state and the consequent need of safeguarding this asset. The association constitutes the central agency to which its members report fire losses, or the measures needed in their sections to prevent fires. It is in a position to cooperate with other agencies engaged in similar work and to point out needed legislation looking to the perpetuation of our timber supply. Patrols are managed by the association for out of the state owners at the actual cost of putting them on. This during the past summer has been taken advantage of in numerous instances.

The formation of additional local patrols has not been as successful as had been hoped for, but the increasing interest in this subject leads to the belief that very shortly the entire timbered area will be systematically patrolled under some such system.

DANGER PLACES ELIMINATED

Two of the most fruitful sources of fires in Oregon are slashings and old burns. The latter are particularly hard to manage. These areas come up to brush and ferns, and since they receive the direct rays of the sun it becomes very easy to start fires in such places during the dry months. Once started they will burn with great intensity and rapidity. In the past it has been the custom of some owners, and this custom is now quite generally adopted, to burn off such areas early in the spring, thus eliminating the lighter and more inflammable material which later is a menace to the surrounding country. This practice becomes unnecessary once the area has come up to young trees which thoroughly shade the ground and thus retain the moisture. Strips in the timber along trails or roads can also be burned to advantage and this will prevent the carelessly thrown away lighted match or cigar from starting a fire. Timber owners now realize fully that careful preparation for the fire season and the elimination of dangerous places is as necessary as careful patrol later on. It generally happens that conditions reach a stage toward the end of the season where fires can be very easily started. This results in a large number of fires at the same time, which taxes the supply of available men and draws a large number of patrolmen from their districts to the fires then burning, thus making it possible for new ones to start. By careful preparation the number of fires which can become started is cut down, and this helps materially to handle the situation later.

Telephone communication can now be had with most patrolmen. This saves each year hundreds of dollars in time and money. Many miles of line

are each year added to reach out of the way points, and as a precautionary measure few things exceed in importance the telephone systems.

STATE AID A STIMULUS

The last session of the legislature passed a most excellent forest fire law, carrying with it an appropriation of $60,000 for the two years, and creating a state board of forestry and the office of state forester. Previously, while a law good in its provisions had been on the statute books, there had been no funds for its enforcement and it speedily fell into disrepute. One of the first things to accomplish under the new law was to instil into the minds of the people a wholesome respect for its provisions. This is being accomplished through the efforts of the state forester and his deputies. Burning dangerous slashings without permit, or the leaving of burning camp fires, is no longer tolerated, and careless citizens are promptly brought to justice. The law is not intended to hamper the rancher who wants to clear his land during the summer, the camper who gets his vacation in the mountains, nor the logger who through his operations is furnishing labor for hundreds of people. It is intended, however, that all parties in the timbered sections use such precautions as will prevent fires starting. This can be done without extra cost or inconvenience and is necessary in order that destruction of property and possibly loss of human life shall not result.

The support and interest of the state has proven a decided stimulus to forest protection in Oregon. Timber owners no longer feel that they are alone in their fight against carelessness in the use of fire. There is every reason why states and counties, as well as the federal government, should aid very materially in preventing the needless destruction of standing timber, since it pays a large proportion of the taxes and is a resource which contributes very largely toward the upbuilding of the country. Forest fires in their results can truly be likened to the pests attacking our fruit trees or vegetables, or diseases making inroads on our live stock industry. Let these latter things happen and the states and counties take immediate steps to remedy the evil. But our timber, so long a drug on the market, has not yet been fully appreciated as an enormous factor in the upbuilding of the state. When its importance is realized Oregon will feel warranted in appropriating not thousands but hundreds of thousands of dollars to safeguard its greatest resource, the timber.

UTILIZING TROOPS IN THE NATIONAL FORESTS

By GEORGE M. CORNWALL.

THE loss of timber in the national forests by fire in 1910, according to Forester Graves in his report to Secretary of Agriculture Wilson, was the greatest since the national forests were created, aggregating six billion feet. The fires covered an area in excess of three million acres. The value of the timber destroyed is estimated at twenty-five million dollars. In addition to the property loss by the nation, seventy-six Forest Service employes gave up their lives. The cost of fighting these forest fires aggregated about one million dollars or less than one per cent of the property saved. The severest losses were experienced in Idaho and western Montana, while the damage inflicted in the national forests in Klamath County, Oregon, was very considerable. At one time last August, Forester C. S. Chapman, at Portland, reported 27 miles of fire line on the Crater National Forest, sweeping madly forward, gathering force and momentum with every mile, and practically carrying everything before its devastating advance.

The states of California, Oregon, Washington, Idaho, and Montana contain practically one-half of the standing timber of the United States. The estimated stumpage of the national forests in these five states is placed at three hundred and eighty-nine billion feet. This timber belongs to the nation. To the Forest Service is entrusted its safe keeping from fire. Up to the present time the amount of money available for the building of roads and trails and the establishment of fire lines has been altogether too limited. Last year 5,500 miles of road and 1,600 miles of trail was built. Considering the extent of the territory to be protected, the available means at command of the Forest Service has been only a bagatelle.

During the terrible fires which devastated northern Idaho and western Montana, the writer happened to be in Spokane, Washington. The exact date was August 4th. The smoke was rolling into the city. The sun assumed a sickly yellowish glare as its rays penerated the smoky atmosphere. The air during these terrific forest fires seems to lose its freshness—the oxygen seems to be wanting—burned up. Things take on an uncanny and exaggerated appearance. The face of nature looks different.

The noon edition of the Spokane Chronicle brought the unwelcome announcement of the death of several brave Forest Service employes, hemmed in by the fires—caught like rats in a trap, while defending the nation's property. The difficulty of getting firefighters was mentioned in the dispatches. Employment office blackboards carried announcements of the necessity for men to go to the front to fight fires. Men fitted for the arduous task were difficult to get. In the meantime the fires were increasing in number. It occurred to the writer that the government should lend the use of the troops. The idea was presented at the meeting of the Western Pine Manufacturers' Association, and a resolution adopted. The Western Forestry and Conservation Association, through its president, A. L. Flewelling, was brought into action, and the following telegram forwarded:

"Probably never in the history of Montana, Idaho, Oregon and California have the losses from forest fires in the National Forests been more destructive than are now raging, and which threaten, unless checked, to destroy millions of dollars of property and endanger the lives of our citizens. We most earnestly suggest that the national troops located in the above states be at once rushed to the scene of the conflagration and cooperate with the Forestry Service with a view of checking and preventing as far as possible, a recurrence of the terrible menace to the property of this nation.

"Western Forestry and Conservation Association, representing Montana, Idaho, Washington, Oregon and California."

(Signed) A. L. FLEWELLING, *President.*
(Signed) GEORGE M. CORNWALL, *Secretary.*

In two days President Taft placed at the disposal of the Forest Service officials a sufficient number of troops to assist in the suppression of the forest fires within the confines of the national forests.

In nearly every instance the troops gave an excellent account of themselves. Accustomed to discipline and provided with the proper equipment for provisions and means of transportation, Uncle Sam's boys acquitted themselves nobly. The officers generally took an interest in the work and instructed their men to take their instructions from the Forest Service officials. There was no clashing of interest. The nation's property was at stake—the soldiers and forest officials were American citizens. They had an interest in its protection.

Perhaps, in this connection, a letter from C. S. Chapman, now manager and secretary of the Oregon Forest Fire Association and until recently in the Forest Service with headquarters at Portland, may prove of interest.

MR. CHAPMAN'S LETTER.

Mr. Chapman says:

"In further reference to the matter of use of federal troops in fighting forest fires, last summer while in charge of the national forest district comprising Oregon, Washington and Alaska, the large number of serious fires made it practically impossible to secure sufficient local men to fight them. The federal troops were, therefore, secured in an effort to save valuable timber threatened by fire. These men performed invaluable services. Not only did they fight fire, but their presence in the country had a very desirable effect, as it led to the belief that a situation requiring federal troops was indeed serious.

"Many of the boys entering the army are brought up on farms and are used to hard work as well as being of a practical turn of mind. It should be an easy matter to train these men into an efficient fire fighting corps. Last summer's experience with the troops leads me to believe that under the supervision of men skilled in fire fighting they can be used to advantage."

As a result of the success attending the use of troops as an auxiliary to the Forest Service, a resolution was passed by the Western Forestry and Conservation Association asking Congress to establish regular filled posts, contiguous to the various national forests, and thereby bring the troops within easy range if their services should be required. The legislature of California also passed a resolution along the same line, the troops having rendered very efficient service in California last year in connection with fires in the national forests in that state. General Wood, chief of staff, opposed the use of the troops for Forest Service duty on the ground that he believes it is subversive

of discipline and that it interferes with the time allotted for maneuvers. Secretary of War Stimpson is also opposed to the diversion of the troops for forest protection on the same grounds as General Wood. Ex-Secretary of War Dickinson was inclined to look with favor on the proposition.

From personal interviews with the officers and soldiers who took part in forest fire fighting, the results showed conclusively that there is no better training than an actual fire-fighting experience for the men. It makes them self-reliant. They find themselves. With a little training their services would prove invaluable. The outdoor life and exercise is healthful and wholesome. It brings them into close touch with civilian life. It helps them in every way. The opportunity for drilling is not removed, and from every standpoint the utilization of the troops for regular forest protection should be encouraged. While actively engaged in fire fighting, additional food, clothes, and pay should be allowed. This incentive in itself, coupled with a break in the monotony of post life, would be a sufficient inducement to create a desire for forest service duty in the minds of men. The duty of the army is to protect and safeguard life and property—and certainly the saving of the nation's timber should not be considered beneath the duty of a true soldier, but rather his privilege.

If President Taft, during his term of office, will provide for the regular employment of the troops to protect the national forests he will have done more in the interest of true and practical conservation than any other single step that has yet been taken. The splendid results which followed from his action last year in this direction would seem to be sufficient justification to carry forward the work so auspiciously begun.

BASKET WILLOW CULTURE IN MARYLAND

By C. D. MELL.

BASKET willow culture in Maryland has long been profitable, but of late years New York state and the eastern central states have entered so strongly into competition with Maryland that the margin of profit has been considerably reduced. One advantage that growers here have over the states farther west is that nearly all of the basket and wicker furniture factories are located in the larger cities near the Atlantic coast and principally in Baltimore, so that the cost of transportation is very little. Growers of basket willows in Ohio, Indiana, Illinois, and Kentucky have to put up their basket willow rods in bundles of 75 to 125 pounds and pay high transportation rates to get them to the factories in Baltimore, Philadelphia, New York and Boston. At the same time good basket willow land in Maryland can be bought for $75 to $100 per acre, while in the eastern central and other basket willow growing states land suitable for growing a successful crop sells for considerably over $100. This makes a still greater difference in the net returns from the plantation. Moreover, the most experienced basket makers always contend that the willows raised in Maryland are far superior to those of any other part of this country. They are reputed to be tougher, more pliable, and for this reason often bring from one to two cents per pound more than willows grown, for instance, in New York or Indiana.

The yield of basket willows here is on the average higher than elsewhere, which is partly due to superior cultivation and partly to the peculiar adaptability of soil and climate. As high as 3,000 pounds (weight when peeled and dried) of good rods are raised on an acre, but to do this a favorable season, good soil, and superior cultivation must be supplied. On the poorer land the average is about as low as 1500 or 2000 pounds to the acre, while an average crop year after year on the good lands is probably about 2500 pounds. A poor crop often consumes the greater part of the profit of a good year, because the labor required to harvest the basket willow is entirely manual, and in the spring when the time comes for cutting and peeling the rods this labor is generally scarce and high. This cuts down the grower's net profit if his crop turns out poorly. Occasionally if the crop is very poor the grower will not attempt to harvest it, but lets it grow, cutting it at the end of the second year.

Basket willows this year promise to net the farmer a fair profit on his investment. A good deal depends, however, upon the peeling, bleaching and drying. The snowy white, sap-peeled rods are much desired in making high grade basket ware, and rods so bleached, carefully graded in quantity and height clases and put up in neat bundles, will bring more than those bunched in a careless manner. To secure the desired color the rods must be spread out in the sun immediately after peeling until they are bleached the desired shade, after which they are put into a drying room.

There is another point which the grower must bear in mind. The peeled rods are placed on racks and left to dry, where they must remain until they are dry enough not to heat after bundling. Great care must be taken to prevent them from getting wet after they have been bleached or while in the process of drying. There is no definite period required for this drying, a good deal depending upon the weather and the size and kind of willows.

AMERICAN GREEN WILLOWS IN PIT PREPARATORY TO PULLING

BASKET WILLOW CULTURE IN MARYLAND

PATENT LEMLEY WILLOW ONE YEAR OLD AT ARLINGTON, VA.

AMERICAN GREEN WILLOW SIX YEARS OLD AT LAUREL, MARYLAND

BASKET WILLOW CULTURE IN MARYLAND

UNDER MINNESOTA'S NEW FOREST LAW

By W. T. COX.

THE Minnesota Forest Service was organized in May, 1911. It was then that the state forestry board, in accordance with the Act of April 12th, appointed "a trained forester" and turned over to him the administrative work of the department. The forest law is a comprehensive one,* carefully drawn and passed upon previous experience in this and other states. It provides an annual appropriation of $75,000, in addition to certain specific appropriations made for the care and protection of the state forest reserves and parks.

The task of the service is enormous. Minnesota originally had approximately 33,000,000 acres of forest. Of this 5,000,000 acres have been cleared for farming, leaving 28,000,000 acres of forest land in the state. This is exclusive of the lakes lying within the forest region. There are about 4,000,000 acres of Indian reservation and national forest lands in the state, leaving 24,000,000 acres extending north and northwestward from the mouth of the St. Croix three hundred miles to the Canadian boundary, and for more than three hundred miles along the boundary from Lake of the Woods to Lake Superior. This enormous area, now largely cut over and much of it burned, it is the duty of the state forest service to protect from fire.

Since the organization of the service last May considerable progress has been made. The state has been divided into twenty fire districts which embrace the coniferous forest region. In charge of each of these districts is a district ranger, selected solely because of his experience and ability as a woodsman—the type of man commonly employed as logging superintendent. These men are located at the most convenient points for reaching the different portions of their districts and keeping in touch with their patrolmen and with the public. The rangers have selected the headquarters for their patrolmen and assigned to each of them a definite area to patrol. Both the rangers and patrolmen have been instructed in the field as to their duties.

Many lookout towers have been erected, and a larger number, as well as some telephone lines, are in process of construction. Trails are being cut out and canoe routes improved to furnish quick means of communication in districts heretofore practically impassable. Wagon roads are being encouraged by substantial assistance in the actual clearing out of the timber where the roads will serve as valuable fire lines. Several fire lines other than wagon roads are being cut out in places where they will play an important part in preventing the spread of fires in dangerous localities. Canoe routes are being mapped as well as improved, and portages improved so that they will no longer have to be dreaded by the traveler. Good camping places are designated, with the idea of persuading people to use the same sites and thus mini-

*The text of the Minnesota forest law was published in AMERICAN FORESTRY, May, 1911, page 307.

mize the danger of greatly strung out or scattered camp fires along the routes of travel. Crude but safe outdoor fire-places are thrown together by the patrolmen for the use of campers in localities much used.

The railroads have been brought to realize that a businesslike system of fire protection is a paying proposition, and they have organized special forces of patrolmen mounted on speeders and placed where the district rangers feel that they will be most effective. These places are, of course, on the heavy grades and along sections of the tracks peculiarly susceptible to the starting of fires. The companies are also paying much more attention than formerly to the question of spark arresters on their locomotives. At least two new spark arresting devices of great promise have been produced within the last three months by the master mechanics of railroad companies within the state.

In the construction of new railroads, wagon roads, trails, etc., the brush is no longer piled along the outside of the right-of-way to serve as a fire trap, but is required to be burned as construction proceeds.

In the summer logging being done this season on a large scale because of the large quantities of timber killed by last summer's fires, the slash has been either burned as the logging progressed, or piled ready for burning late in the fall or early in the spring, depending upon the character of the timber. The most economical and satisfactory method for the disposal of slash differs widely in different types of forest, so that the method to be used in each case is left to the district ranger to prescribe, the idea being to cooperate with the lumber companies in working out the best method for each individual tract. There is no disposition to be arbitrary, but there is a persistent desire to get rid of the slash which constitutes a fire danger.

Cooperation with the settlers is being brought about. The settlers are coming to realize the importance of forest fire prevention to themselves and the community, and in many localities are rendering valuable assistance to the rangers. Volunteer fire brigades, similar to the ones maintained in villages, are being organized in communities where this is feasible. Control of forest fires will be much more effective when the rich agricultural lands of northern Minnesota are thickly settled, thus cutting the forest region into belts and irregular tracts, and confining it to the poor, sandy, or rocky land, which alone should be maintained in forest.

The state has made a good start in the matter of creating parks and forest reserves. Principal among these are Itasca Park, which includes the source of the Mississippi, and Burntside Forest in the wild rocky region north of the Vermilion Range. It is the duty of the state forest service to care for and improve the state reserves, which are rapidly coming to be appreciated for their beautiful lakes and pine forests, full of ideal spots for summer camps.

The rangers serve as special game wardens without pay, and the regular game wardens of the game and fish commission serve as special forest rangers, thus increasing the force of men devoting their efforts toward making safe and accessible the great forests of northern Minnesota.

PROGRESS OF FORESTRY IN WISCONSIN

By FRANK B. MOODY
Assistant State Forester

THE past season has closed a year of the greatest activity in forestry matters in the history of the state. Roads, trails and fire lines have been built, making protection possible in regions of greatest fire menace; a patrol system has been inaugurated; plantations of pine have been established and a nursery has been started. The people have been aroused to the necessity and are beginning to realize the feasibility of a system of fire protection and of reforestation, and the state legislature has granted appropriations which will allow a sure and fairly rapid development of both.

By an act of the state legislature in 1903, a non-political state board of forestry was created consisting of the president of the state university, the dean of the agricultural college, the director of the state geological survey and one member appointed by the governor. The members of this board hold office indefinitely and receive no salary, although traveling expenses are allowed when actually engaged in work pertaining to forestry. The following year a state forester was appointed by this board and in 1906 an assistant state forester was selected by civil service examination.

By various acts of the state legislature and by orders of the state board of forestry the forest reserves were increased from 40,000 acres in 1904 to 254,000 acres in 1908, all of which are north of Township 33 and scattered throughout seventeen counties in the northern part of the state. The scattering agricultural land in all counties except Vilas, Forest, Oneida, and parts of Price and Iron, was appraised and placed on the market. The proceeds of such sales go into a forest reserve fund which is available for the purchase of other lands to be added to the permanent reserve area in the above-named counties which lie at the headwaters of the Wisconsin and the Chippewa Rivers. These lands are for the most part cut and burned over pineries with scattered patches of pine reproduction. All money received from the sales of land, timber, and other forest products is credited to the forest reserve fund and is at the disposal of the state board of forestry for improvements, protection, and for the purchase of interior holdings. This year (1911) an appropriation was granted allowing $50,000 annually for a period of five years, to be used exclusively for the purchase of land. The annual appropriation was increased from $9,800 in 1903 to $35,000 in 1911 to provide for a patrol system, permanent improvements, and reforestation. In 1906 the federal government granted the state 20,000 acres of public land north of Township 33 as an addition to the state reserve. Proceeds from the sale of any portion of this grant go into a fund which can be used for reforestation only.

At the present time the reserve comprises 380,000 acres of which a small part is timbered and the remainder is cut-over land and swamp. The cut-over lands were logged by railroad, leaving a network of old grades which can be readily transformed into wagon roads and fire-lines. Within the permanent

reserve area are hundreds of lakes which form the reservoir of the Wisconsin and the Chippewa Rivers. These lakes are ideal summer resort sites, many of which can be reached only with great difficulty. Thousands of people take advantage of the more accessible places during the summer. Since the state owns nearly all the land bordering on these lakes and the revenue from timber sales is small, it is the policy of the board to lease cottage sites and open up roads to increase accessibility. The roads are laid out in such a way as to make the country more easily patrolled for fire protection and at the same time serve as routes to resorts.

This spring a patrol system was organized in which the federal government co-operates with the state. The territory to be covered includes about sixty townships, of which about one-half should be well patrolled during the dry season on account of railroads, fishermen, hunters, and settlers. The other half need not be watched so closely, for there are practically no settlers and very few sportsmen get into this country, as traveling is difficult and no railroads pass through. These two halves are not in solid blocks but are irregular interwoven areas. Each ranger is assigned a district, varying from a little less than one township to about two townships, the size being governed by the fire menace and ease of patrol. Where railroads and good wagon roads make the area very accessible, there is usually a telephone system and one ranger can keep in touch with all parts of a large district. Where the opposite conditions prevail, the ranger is assigned a much smaller area to patrol. A number of steel-framed watch-towers placed at vantage points aid the rangers to keep so large a territory well under surveillance, and telephones connecting the towers with ranger stations and with the assistant state forester's headquarters at Trout Lake, make the system quite efficient for fire protection.

The federal government in co-operating with the state is furnishing funds for rangers' salaries only. There are at present twelve rangers whose salaries are paid from this fund and twelve, including one head ranger, paid from the state funds. All state rangers are selected from applicants who have passed a state civil service examination and are appointed for the entire year. They are given police powers to prevent setting of fires, but are not authorized to act as game wardens. Each ranger has authority to hire as many men as necessary for fire-fighting, and these men are paid immediately from a fund for temporary assistance, made available to the assistant state forester. When not on patrol duty, the ranger's work consists in building roads, fire-lines and trails, cutting posts and telephone poles, getting data for correction of existing maps and for the new features of a more up-to-date map.

The rangers who receive pay from the federal government are hired for about five months of the year during the season of greatest danger from fire. They have the same powers of police and authority to hire men for fire-fighting as the state-paid rangers. Provision was made for them to help in fire protection work when patrol is unnecessary.

The head ranger has general supervision over both state and federal rangers and acts as inspector, visiting each ranger about once in ten days. He has, however, no additional powers or authority. The very nature of his work demands that he have saddle horses and these he furnishes and feeds.

The ranger's expenses are paid while away from his own station, and when on road work or fire-fighting with a gang of men, the state furnishes bed and board for all men in camp. At the present time rangers are not required to keep horses for patrol work, as traveling in most districts has been difficult and is about as fast on foot as on horseback. After this year,

however, main roads will make horses more efficient and rangers will be required to supply them.

It is planned to build a road system in which the main roads will checkerboard the whole reserve area in such a way that they will be about three miles apart or as nearly that as the many lakes and swamps and the abandoned logging road grades will allow. From the main roads, fire-lines will be made to cut the areas into plots of about forty acres each. These plots will very often be extremely irregular and in order to make strategic points accessible, trails will be brushed out. The main roads are for the most part built by removing the ties from old abandoned logging railroad grades and leveling off the surface with plows and drags. The result is an excellent wagon road with grades rarely exceeding seven per cent, all for a cost of about $50 per mile. Wherever possible, fire-lines are built by simply dragging old railroad grades after the ties have been removed. Where roads will become main thoroughfares, care is taken to build them well for permanent use, while less expensive fire-lines and trails are made when protection is the only reason for their construction. Sometimes it is necessary to cut lines between natural fire protections such as lakes, wet swamps, etc. Here, the lines are made about thirty feet wide, the brush cut out and burned and the line plowed and dragged. There are now about 100 miles of main road and about 50 miles of fire-lines. The latter were built to protect plantations and what little natural reproduction survived the big fires of the past three years.

The reforestation policy was vigorously pushed this year. A nursery site was chosen, centrally located for field planting and well protected by forest on three sides. An area was cleared off for a nursery with a capacity of about one million seedlings annually; a water system using the Perry pneumatic pump was installed, and a main pipe and laterals laid so that a fifty-foot hose would reach all the beds. The beds were laid out 4 x 12 feet with 18-inch paths. Each bed was surrounded by a frame covered with poultry wire and provided with two removable top screens, one of poultry wire and the other of lath. Over 200 beds were made, of which 84 were planted to white pine, 64 to Norway pine, 28 to Scotch pine, 14 to western yellow pine and 16 to Norway spruce. Most of the seed was sown broadcast, a small part in drills. Germination was rapid on account of the very warm spring and effects of damping off soon appeared. In calculating the amount of seed to sow, an allowance was made for loss due to various causes and as this is the first nursery established in this region, a rather large factor of safety was used. Damping off caused the greatest damage, but even that was slight. The white pines suffered a loss of 10 per cent; Norway pine, the seed of which was collected near the nursery site, did not show any effects of the disease, while that collected in other localities suffered a loss of five per cent. About fifteen per cent of the Scotch pine and forty per cent of the Norway spruce were killed. The western yellow pine was not affected. The nursery was almost entirely free from weeds during the whole growing season, due perhaps to the fact that the ground was broken up for the first time and weeds that grow in free sunlight had not had a chance to seed up the area, and those that had formerly grown there would not stand the full light. The rodents did not bother the first planting, but a few beds that were sown later in the summer were entirely destroyed. The final counts show that a factor of safety slightly too large had been used and where a million seedlings were expected, about one and one-fourth million were produced. These will be transplanted when two years old.

During the three or four years necessary for these seedlings to grow to a suitable size for field planting, plantation operations will be carried on with

stock purchased from commercial nurseries. The first forest planting ever undertaken by the state was done this spring with stock of this sort. Planting areas of about forty acres each were chosen which would require the minimum amount of artificial fire-lines to protect them. They were close enough together so that all work could be done from one camp. About fifty men were hired for the planting season. They were mostly "lumber jacks" who had never before planted trees and were naturally careless with their work, necessitating close supervision. The planting was done with mattocks in the more favorable open spots between stumps and masses of brush where the spacing was unavoidably irregular, but approximated six feet each way. There were nearly 200,000 trees planted, of which 182,000 were white pine, 5,000 western yellow pine, 5,000 Norway spruce, and 1,100 Norway pine. The white pines were three-year-old seedlings and the others were four-year-old stock which had been in the transplant beds two years. They were vigorous healthy-looking plants, but on account of careless packing for shipment, a rather large percentage were received in poor condition. The work of planting extended over a period of ten days, during which the weather was cloudy and rainy, making an excellent planting period. The month following was dry and hot, while the remainder of the summer was wet and cool. The results for the season's planting were very favorable. Counts of living and dead plants on half-acre plots show that 60 per cent of the white pine are alive, 75 per cent of the Norway pine, 55 per cent of the Norway spruce and 98 per cent of the western yellow pine.

Permanent headquarters for the assistant state forester have been built at Trout Lake, Vilas County, near the large central nursery and in the geographical center of the state forest area. Here the assistant forester is in touch with all the rangers by telephone and from here all parts of the forest are easily reached by either railroad or wagon road or trail. This will be the central distributing point for supplies, tools and equipment for the rangers. From here instructions will be issued to them, and orders given for field work of various kinds, in fact, a great deal of the business of the woods will be transacted at this point. Should the University of Wisconsin establish a ranger school, a matter now under consideration, the field instruction will be given at the Trout Lake headquarters. Negotiations are under way for equipping this station with apparatus for measuring rain-fall, wind velocity, humidity, etc., in co-operation with the United States Weather Bureau. This fall enough seed will be collected to furnish the nursery already established and the one that will be started in the spring at Tomahawk Lake. The site has been chosen and plans made for the new nursery to produce 500,000 plants annually. Next spring about 60,000 trees will be planted in the field and the work on telephone systems, roads and fire-lines will be continued.

HOW ONE NATIONAL FOREST IS PROTECTED

By D. N. ROGERS.

THE Plumas National Forest, comprising 1,433,600 acres in the northern Sierra Nevada Mountains of California, is divided into thirteen administrative districts. Each of these is in charge of one or more rangers, depending upon the amount of business in the district. It has been found from experience that upon eight of these districts, including nearly all of the western part of the forest lying west of the Grizzly Range and Indian Valley, the danger from fire is particularly great. Accordingly, in planning a system of fire protection for the entire forest, the preparation for patrol was confined for the most part to these districts. Considerable past experience upon the forest with different systems of fire protection had shown that by the use of lookout points the effectiveness of the patrol could be greatly increased. A careful survey was therefore made of the entire western section of the forest, and two peaks from which fires could be located upon nearly all the dangerous territory were selected as lookout points. Headquarters were provided for the lookout men who would be stationed on these peaks during the entire fire season, and telephone lines were constructed from the lookout peaks to the supervisor's office at Quincy. New telephone lines were also constructed in addition to those already in use, so as to give direct connection from the supervisor's office to every ranger's district upon the forest.

In order to make the lookout from these peaks as effective as possible, three maps of the entire forest were prepared, one for the supervisor's office and one for each of the lookout points. To assist in accurately locating fires, these maps are sectionized, and also show the towns and the topography by peaks, rivers, creeks, valleys, etc. Upon the maps used on the lookout peaks, the courses are laid off at a distance of two degrees apart, upon a circle around the lookout point, the courses being indicated by lines extending from the point of observation to the exterior boundary of the forest. The map is properly oriented and attached securely to a permanent table. From these direction lines the course of each fire is determined by use of an alidade, and this information is then telephoned in to the supervisor. The map in the supervisor's office is practically a duplicate of the lookout map, except that both lookout stations are shown and the direction lines are drawn from each so that they intersect upon that part of the territory which can be seen from both lookouts. When a fire occurs which can be observed by both lookouts, it is thus possible to locate it by means of the intersection of the courses which are telephoned in by the lookouts.

During this season, fires which have occurred at not too great a distance from either lookout point, have been located by intersection exactly. Where the fires have occurred at some distance, location by this means has been made within less than one-quarter of a mile. The accuracy with which fires can be located by this means is a matter of very great importance in the effectiveness of the lookout peaks, since the ranger upon whose district the fire occurs can be notified of its exact location, and can consequently reach it without unnecessary delay.

In addition to the lookout men, a riding patrol is maintained upon each of the fire districts. This patrol consists of one or two men, depending upon the fire danger in that particular district. The patrol men ride over the district each day, always reporting to the supervisor by telephone two or three times a day in order that the supervisor may keep in touch with them and that they may be notified of any fire reported by the lookout men. The patrolmen not only keep a careful lookout for fire, but also make it a point to interview campers and forest users, ascertaining their names whenever it seems advisable and giving instructions concerning camp fires, etc. The riding patrol is exceedingly effective in securing the campers' compliance with the fire laws, in view of the fact that the penalty for leaving camp fires unextinguished is now very heavy and there is always more or less uncertainty as to just when the patrol man is liable to appear.

In addition to the lookout men and riding patrol upon the fire districts, fire companies are being organized which will be in readiness to respond to the fire call at a moment's notice. They consist of from 10 to 15 picked men, who may be employed at the saw mills, or at mining or logging operations, situated throughout the fire district. The number of these companies depends of course upon the fire danger and upon the resources from which they can be drawn. In some of the districts the companies are made up from among the ranchers who live in the district permanently.

In the organization of the fire companies, especially at the mills and in the case of lumber and mining companies, an agreement is entered into with the boss of the operating camp to the effect that certain men, who have been previously selected, shall respond immediately to any call for assistance for fighting fire within certain parts of the fire district. If a fire is discovered by the operating camp, the fire company immediately proceeds to the fire without waiting for orders from a forest officer. It is previously understood that the men composing this fire company will be paid by the government for services rendered for fighting a forest fire which does not threaten the property of the lumber or mining company. The particular advantages of this organization are that the men understand fire fighting thoroughly and respond quickly because they are sure of receiving their pay, while at the same time through previous arrangement no unnecessary inconvenience is caused their employers.

In addition to the patrol of the national forest administrative districts, the Service is working in co-operation with the Western Pacific Railroad Company, whose right of way extends across the entire forest. The company holds its section foremen responsible for immediate action in fighting any fire which may occur along its right of way. The train engineers and conductors are instructed to report to the nearest station agent all fires which they observe. The station agent then promptly notifies the foreman in charge of that section of the right of way upon which the particular fire is located, and in addition notifies the supervisor by telegraph or telephone in order that, if necessary, the Forest Service may render assistance. Through this co-operation the Western Pacific officials often communicate to the supervisor reports upon fires which are entirely without their right of way, but which may not have been observed by the forest patrol force.

The effectiveness of the fire protection system upon the Plumas National Forest is very well indicated by the fact that out of the 31 fires which occurred during the month of July, the total area burned over was less than 111 acres; 75 per cent of these fires burned over less than one acre each, and the largest fire burned over an area of less than 20 acres.

SEED HOUSES OF NORTHEASTERN FORESTRY COMPANY, WILLSBORO, NEW YORK

WHITE PINE SEEDLINGS, FROM BROADCASTING IN 1906

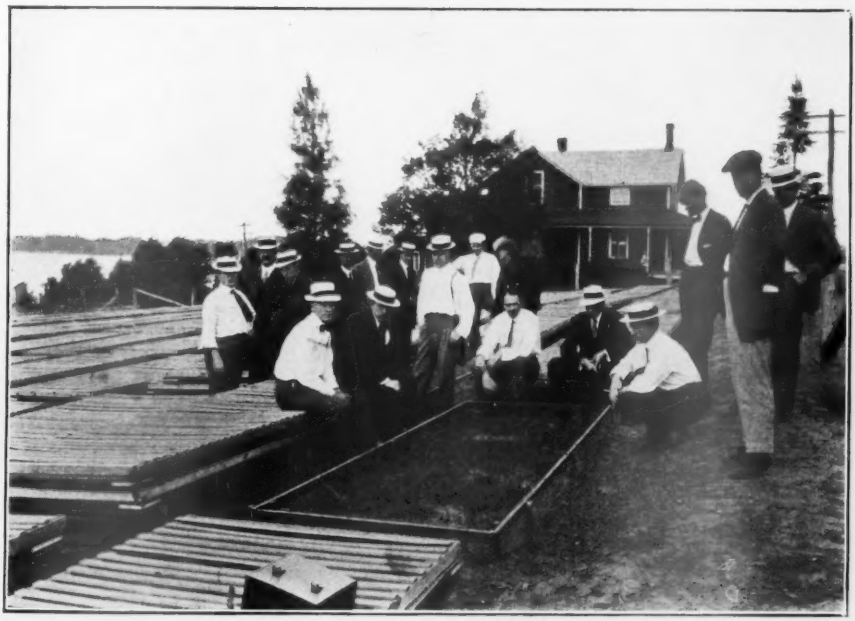
CRATES FOR CONES IN OVEN HOUSE, NORTHEASTERN FORESTRY COMPANY, WILLSBORO, NEW YORK

STATE PLANTATION OF SCOTCH PINE MADE IN 1905, WITH TENT OF FOREST GUARD. NEAR LAKE PLACID, NEW YORK

EASTERN STATES FORESTERS

IN PLANTATION OF SCOTCH PINE ELEVEN YEARS OLD, ON STATE LAND NEAR LAKE PLACID, NEW YORK

PART OF A TWENTY-FIVE-ACRE PLANTING OF RED PINE, SEVEN YEARS OLD. A CHEERING OUTLOOK FOR THE FUTURE OF PLANTING IN THE NORTH-EAST



EASTERN STATES FORESTERS

IN STATE NURSERY, LAKE CLEAR, NEW YORK SHOWING THIS SEASON'S SEED BEDS

YELLOW BIRCH IN VIRGIN MIXED FOREST NEAR RAQUETTE LAKE, NEW YORK

THE SUMMER MEETING OF EASTERN FORESTERS

By HUGH P. BAKER.

ON July fourteenth and fifteenth, the Association of Eastern Foresters held a successful meeting in northern New York with headquarters at Saranac Lake. This is the first time that the organization has held a meeting in which others than those connected immediately with state work were included. Feeling that the society could not only broaden its sphere of action and influence, but greatly strengthen and increase the usefulness of its work, the state foresters decided to include practicing foresters in all other lines in the eastern states. This brought in for the first time this year a number of men from various forest schools and several foresters in the employ of large corporations and in private work.

The day previous to the meeting the writer, with a member of the Northeastern Forestry Company, had the good fortune to jog along slowly up the western shore of Champlain, stopping at one or two small nurseries operated by this company, and at Willsboro looked over their new seed houses built last year. These houses are very complete indeed and probably the best of their kind in America. The large house shown in the accompanying illustration has a capacity of six thousand bushels of cones. These are spread out on racks made of lath, which are light and easily adjustable, extending in tiers from the floor to the ceiling. The small house is fifteen by thirty and is occupied by the ovens in which the cones are heated after removal from the larger dry house. The method used for the removal of wings from seed is not an entirely practical one, because of the amount of hand work involved and the problem of developing cheaper and quicker methods is a little difficult to solve because of the size of the plant. The Appel concern in Darmstadt having very much more extensive ovens has developed machinery which does the work satisfactorily, though they figure on some loss from crushing and mangling of the seed.

After leaving Willsboro we stopped for a few hours at Bluff Point, where Mr. H. S. Bristol, forester for the Delaware & Hudson Railroad, is developing an extensive forest nursery. This nursery is excellently laid out and has an effective water system, but the extremely sandy nature of the soil rather leads one to feel that we are sacrificing in this country certain important conditions in the nursery to get a soil that is easily worked and warm. When a season is as hot and dry as the past one, nurseries located in such situations are sure to suffer and the matter of supplying proper amounts of plant food in the soil is an extremely important question which is probably solved easier by the railroad than by others in nursery work in the east, because of cheap and easy transportation.

At Plattsburg the party of three was increased by several from across the lake, and the next morning a very interesting run was made into the thick of the Adirondacks to a little station beyond Saranac Lake, where the entire party of eighteen foresters began a series of unusually attractive excursions under guidance of Mr. C. R. Pettis, superintendent of state forests, and his

assistant, Mr. Howard, the hosts for the meeting. We went at once through some excellent Scotch pine plantings four years old and also some white pine and European larch, the average cost of planting of which was eight dollars per acre. From Raybrook we drove on toward Lake Placid and took another very instructive walk through more extensive plantings of Scotch pine made in 1905 in which there is almost a perfect stand. The growth of this species has been so satisfactory that one is convinced almost that the Scotch pine has a future in the United States. The accompanying illustration shows a portion of this plantation with the tent of the forest guard.

After dinner at Lake Placid, we went back to Lake Clear Junction and there visited what is probably the most extensive and oldest plantation of Scotch pine in the United States. The view of the party together is taken standing against this plantation. The planting was made in 1902, spacing six by six feet, and many of the trees are now fifteen feet high. Mr. Pettis explained that the Scotch pine does not do as well where duff covers the sand; also that white pine had failed here as elsewhere in the immediate region, because of the formation of a secondary root system, causing the entire vitality of the tree to go into the formation of adventitious roots. Here a considerable number of white pine had been removed and burned, because of infection by blister rust. This plantation of Scotch pine with one or two plantations of red pine and white pine, seen the next day at Paul Smith's, are among the finest examples of reforestation in the United States and compare very favorably indeed with reforestation of similar lands in either Germany or France.

Following the examination of plantations, several large nurseries at Lake Clear Junction and at Saranac Inn were visited. One of the accompanying illustrations shows the party in the nursery at Lake Clear Junction examining this season's seed beds. In a number of beds of white pine, it was estimated that there were nine thousand seedlings in a space four by twelve feet. Ants were causing some injury in spruce beds, but where they were not working the average stand in four by twelve feet space was estimated at fifteen thousand. The average for spruce seedlings in beds of similar size in 1910 was given as fourteen thousand. Damping-off had started in the red pine and as sulphur seemed to cause baking of the soil, dry sand was used with very satisfactory results. After seedlings were well started, six pounds of bone meal were used to the beds of pine, but no bone meal was put on the spruce. Here and there in the pine slight injury had been caused by irregular scattering of the bone meal and by too much lying upon or about the seedlings. The soil was a sandy loam and this spring a very heavy dressing of manure was given previous to the working up of the beds. The treatment with manure and subsequent use of bone meal has produced unusually strong seedlings, stocky and of good color. In fact, the number of seedlings produced per square foot exceeds, if anything, the number produced in the average forest nursery of central and southern Germany. It is probable that a larger number of seedlings may be produced in limited situations where the ground has been worked for a long period and is exceedingly rich, but there will be little reason for increasing the production per square foot above that now obtained in these nurseries in northern New York. It was stated that in 1910 the acre and three-fourths at Lake Clear Junction produced six million seedlings. Following a visit to the seed beds a twelve-acre transplant nursery was looked over in which there were standing one-fourth of a million seedlings to the acre. It was estimated that the cost of the transplanted seedlings at the end of the third year was two dollars to two dollars and fifty cents a thousand.

The evening was given up to a business meeting at Saranac Lake in which

plans for the future were discussed and a number of new members were elected. It was decided that the membership of the association apart from those in state service or connected with schools of forestry should be limited to men who would be likely to be of value in the society. A day and evening meeting will be held in New York city sometime in January for a thorough discussion of topics of special interest in forest work in the eastern states.

A steady rain on the morning of the fifteenth dampened the ardor of a number who left for the south and east during the forenoon. About noon a run was made to Lake Clear Junction and thence to Paul Smith's, where an excursion was made to unusually extensive experiments in seed spot planting. After lunch at the camp of the forest watch, these spot plantings were gone over carefully and some interesting results seen. Scotch and white pine had succeeded best in the seed spots and the loss with the other species in most instances was complete. Adjoining the area upon which the spot planting had been done is a tract of twenty-five hundred acres planted to white and Scotch pine. Considerable replanting was necessary here because of loss of previous years due to poor planting and dryness. One very interesting feature of the work in this vicinity was a side hill upon which white pine had been broadcasted. The seeding was done in 1906 on a slope of about thirty per cent with a southeastern and northwestern exposure. The results were good, as can be seen in the accompanying photograph, which compares size of seedlings with a hat. Upon the return to Paul Smith's a three-acre planting of bull pine seven years from seed was seen. While a growth of brakes was exceedingly heavy, this pine seemed to be doing excellently and, no doubt, has great promise for very dry situations throughout the eastern states. Of all the plantations visited, a tract planted to red pine was the most interesting and attractive. Twenty-five acres near the above-mentioned planting of bull pine was put out seven years ago and there is to-day almost a complete stand. The ground is a very gravelly drift soil well adapted to the red pine and the heavy annual growth of brakes has not seemed to injure the development of the plantation in any way. The pine, as shown in accompanying cut, is now overtopping the brakes and within a short time there will be almost perfect forest conditions. If those skeptical as to the future of planting in the eastern states will visit this red pine plantation all doubt will be removed and in its place will come enthusiasm and confidence as to the future of forestry in this country. The plantation convinces one also that the red pine should be used more where soils are right and that its growth during an entire rotation will probably compare favorably with any conifer that can be used in the eastern states. The meeting was closed at Paul Smith's after several strenuous athletic contests.

The next day three of the party ran in to Raquette Lake and looked over some of the virgin forests along the west shore. The accompanying illustration is quite typical of present conditions of the forest in Township 40. There is a great deal of mature timber and very light growth of saplings and seedlings to insure a satisfactory forest after the older trees are removed by either natural or artificial means.

These meetings of the eastern foresters mark the beginning of a different type of forestry meetings in this country. They are in reality conferences between the men who are trying to solve definite problems, supplemented by opportunities to observe and study what is going on in the various parts of the east. Much of the success of this meeting was due to the energetic thoughtfulness of the host, Mr. Pettis.

The following men were present: Samuel N. Spring, state forester of Con-

necticut; James W. Toumey, professor in the Yale Forest School; H. H. Chapman, professor in the Yale Forest School; Ralph C. Hawley, professor in the Yale Forest School; F. W. Besley, state forester of Maryland; F. William Rane, state forester of Massachusetts; R. T. Fisher, professor in the Harvard Forest School; F. F. Moon, professor of forestry at Massachusetts Agricultural College; C. R. Pettis, superintendent of state forests, New York; Hugh P. Baker, professor of forestry in the Pennsylvania State College; Austin F. Hawes, state forester of New Hampshire; Charles P. Wilber, state fire warden of New Jersey; Alfred Gaskill, state forester of New Jersey; William G. Howard, assistant superintendent of state forests of New York. And as guests, the following: H. S. Bristol, superintendent of woodlands, Delaware & Hudson Railroad Company, New York; J. G. Peters, United States Forest Service.

SPRUCE AND BIRCH IN VIRGIN FOREST, RAQUETTE LAKE, NEW YORK. TYPICAL MIXED FOREST OF NORTHERN APPALACHIANS

CAMP DOCK, LOOKING EAST FROM ASSEMBLY TENT

MICHIGAN AGRICULTURAL COLLEGE CAMP

STEAM LOADER, LOCATED NEAR THE CAMP. THIS AVERAGED 25 CARLOADS A DAY

STREET TREES

By J. J. LEVISON, B. A., M. F.

Forester in Charge of the Trees in the Parks of Brooklyn

THE park superintendent of today is facing a new problem. Those old neglected street trees are now gradually becoming his care and the people are even more particular about them than they are about the parks, because in the street tree the citizen takes a proprietary interest. It is his tree; he sees it daily, is directly benefited by it and expects it to be thrifty and sightly. The park superintendent must meet this problem and if he meets it well, it is that much to his credit. What then are the fundamental principles of street tree planting and care and how shall he go about the problem?

First of all the street trees as well as the park trees should be controlled by the municipality and placed under the jurisdiction of a single head. *Municipal control* is the only way of securing uniformity in planting—very essential on streets—it is the only way of controlling insect and fungus invasions over large areas and of doing anything systematically and at the right time. *Co-ordination of effort,* that is, combining all city tree work into one bureau is also the only way of insuring the absolute eradication of insect and fungous pests, of securing uniformity and efficiency in methods, material and apparatus and of getting the work done at the least possible cost. All city tree problems both in the parks and on the streets are interdependent and divided effort would mean loss of time, money and trees.

With the work co-ordinated, place the responsibility of all tree matters on a *professional forester,* a man trained in the science of forestry and arboriculture and one of considerable experience in park work. His duties will be to see to all planting, spraying, pruning and cultivating. He will establish a municipal nursery, test the various insecticides and fungicides, install the best apparatus and enforce the city tree ordinances. He will organize the office work, plot the street trees on a map and advise citizens on their tree problems. He will issue permits for tree removal and private tree pruning, study the local tree problems, collect tree statistics and promote public interest through lectures and writing.

The enactment of a good city *tree ordinance* is the next step. There are a number of cities that now have such ordinances in force and the new one may be modeled from those. Your tools to work with are then provided and if your trained expert is a good one, you can leave the details of carrying out the work to him. Oversee his work occasionally, give him the benefit of your wider experience and back him when necessary because in the beginning of all such work there frequently appear many cases of opposition from citizens who either for selfish motives or otherwise try to force their own views in the matter of handling technical tree problems.

The attention of the forester will first probably be directed to the care of the existing trees rather than to the addition of new ones.

Spraying for leaf-eating insects may be his first work. Street trees growing under less favorable conditions than park trees are naturally weaker and

more susceptible to insect attack. Street elms without care very seldom escape attack from the elm leaf beetle and such trees as the horsechestnut and linden are titbits for leaf-eating caterpillars. Let all such spraying be done early, while the insect is young and susceptible to the poison. It is also important to look into the chemical and physical value of the insecticide you are using.

A few years ago I found one of the best known brands of arsenate of lead to contain as little as 4 per cent of arsenic oxide, whereas it should have had 15 per cent or more to be the least effective. Since then, we have been purchasing our spraying material subject to chemical and physical tests and have been paying considerably less than we had been paying before.

Success in spraying will, moreover, depend not only on the value of the insecticide and upon how early in its feeding stage the insect is attacked, but also on the thoroughness with which the work is done. The kind of apparatus used will also make an appreciable difference, for a barrel pump is too slow for the amount of labor used to operate it and a very heavy wooden tank such as is commonly used for woodland spraying would prove too sluggish and cumbersome in going about the city streets.

In late summer and early fall, *pruning* will be in season. The men should then be trained in the fundamental principles of the work and furnished with printed hints on the necessary precautions in climbing trees and removing branches. We have had little booklets published on such topics for our men and find them very helpful. Close cuts and application of coal tar to the wounds should always be insisted upon and above everything else, do not let them prune more than is necessary. The tendency on street trees has generally been the other way to the great detriment of the trees.

Cavities caused by some old neglected horse-bitten wound or by an improperly made cut, are more common in street trees than in park trees and the present tendency is to indiscriminately fill them all with cement. This work is expensive and in many cases unjustified. It is particularly true of trees on the streets because there the trees are frequently of poor species and the cavities so neglected that the absolute elimination of diseased wood is utterly impossible. There the decay would keep on developing after treatment with the same rapidity as before. Cavity filling is justifiable only where the tree is a much valued specimen, where the filling can serve the practical purpose of eliminating moisture and where every trace of diseased wood can be thoroughly removed before the filling is inserted. In many cases the proper use of the chisel or gouge alone without the filling will eliminate all disease and leave the wound in a position where moisture will not collect. The absolute eradication of all infested wood from a neglected cavity is often impossible and in many cases where this is true, the axe is by far the safest and most practicable tool. Street trees especially should be cut down as soon as they become the least dangerous or when their trunks become hollow or badly infested with disease. For, as soon as the citizen notifies the authorities of the condition of his tree, all responsibility is shifted on the city and law suits are sure to follow in case of any subsequent damage.

Spring is the time for *planting,* but the preparations for planting should be commenced in the fall. Fall is the time to purchase trees and leave them standing labeled in the nursery for spring delivery. Holes in the sidewalk about 5 feet long and 3 feet wide and 3 feet deep may be opened in the fall and the ashes, tin cans and beer bottles frequently composing a street soil may be changed for a cubic yard of rich black loam.

In selecting the trees for street planting consideration should be given not only to the species but to the *specimen* as well. The specimen tree should be about 2½ inches in diameter, should possess a straight trunk, a definite leader

and a symmetrical crown, commencing at 7 to 9 feet from the ground. It is sometimes difficult to find trees that will in every respect meet these specifications and it might then be well to agree to a smaller diameter, but to insist on well-formed specimens. Individual perfection, symmetry and uniformity are fundamental principles in successful street planting. For this reason, it is important to plant trees of the same species on the same street or at least on a stretch of several blocks; to have all trees of uniform size and to set them out at equal distances apart. Thirty feet apart is a suitable distance for most street trees and a tree like the elm should be allowed 60 feet. It is in the realization of just such points wherein lie the advantage in having a municipality undertake such work. If left to the citizens to do this individually, the trees will be planted either too close or too far apart. Many species will be mixed on the same block and many blocks will have no trees at all.

As to the *selection of the species* that will, of course, vary with the local conditions. In a general way, however, persons in the East will find the *Oriental sycamore* the hardiest of all for street planting. The sycamore has lately been slightly afflicted with a leaf blight (gloeosporeum nevisequum), but the disease has not become general enough to do serious damage. The *Norway maple* is another tree equally desirable. The oaks, though of slower growth at first are by far the noblest and most long-lived trees. The *red, pin* and *scarlet* oaks are the three best species for street purposes. The red oak is faster growing and least fastidious in its soil and moisture requirements. The pin oak is most beautiful when its low pendulous branches are disturbed as little as possible and when its roots can get plenty of moisture. The tree is therefore best adapted for suburban sections. The scarlet oak is worth the trial for its persistent and brilliant foliage. The *ginkgo* has demonstrated its adaptability to poor soils, to unfavorable city conditions and its resistance to insects and disease. It should be tried to a greater extent for street planting than it generally is. The English elm is another tree doing well in many large cities.

There are a number of trees that are planted for their admirable qualities of either form, color or beauty of their flowers, but requiring special favorable conditions and care, they should be chosen with a greater degree of hesitancy than the above and planted preferably in the suburban sections rather than in the heart of the city. The principal of these are the sugar and red maples, European linden, horsechestnut, American elm and tulip tree.

The *sugar maple* has a symmetrical form and combines many shades of color in the fall, but requires plenty of moisture. In the vicinity of New York city, the trees of this species planted in the heart of the city are rapidly dying off and there is no other cause attributable for this condition except the excessive evaporation from the leaves against the meagre quantity of moisture taken in by the roots from the impoverished street soil.

The *red maple* and the *linden* are both moisture-loving trees, and the latter is a favorite food for insect pests. The *European linden* is the better tree for street planting. The *American linden* grows very straggly in the vicinity of New York though it seems to do better further south. The *horsechestnut* prefers a rich soil and is subject to a fungus disease, which discolors its leaves causing them to drop in midsummer. It is also a common victim of "slime flux," a disease that causes the flow of sap from crevices in the trunk. The tree is used extensively abroad for street planting, but for reasons just stated, should be used more sparingly in this country. The *elm* has the noblest form of all our shade trees, but should be planted on wide avenues, in suburban sections where it can find a deep, rich, moist soil and plenty of unvitiated air. The tulip tree compares favorably with other species in form and attractive-

ness but is so exacting in its soil and moisture requirements that only young specimens should be used and its planting restricted to suburban sections.

The *objectionable trees* for street planting are all the *poplars*, the *silver* and *sycamore maples*, the *catalpa* and *male ailanthus*. The poplars are very short-lived trees. They are dangerous in windstorms and grow so fast as to require constant cutting back. At a certain age their roots upset the sidewalk and their fine rootlets clog the neighboring water and sewer pipes. Their leaves drop very early in the fall and if the species is of the pistillate kind, the catkins falling on the sidewalk become a danger and a nuisance to pedestrians. The silver maples are constantly full of dead wood, are subject to boring insects and are short-lived. The sycamore maple is a favorite of boring insects in the vicinity of New York though in other places it has escaped these pests. The variety of ailanthus tree that bears the male or staminate flowers generates a strong, rather oppressive odor, but if the pistillate form is chosen, the tree will produce a beautiful head and will grow in places where no other tree will grow.

Such are the principal problems of those charged with the care of street trees. I have not attempted to dilate on the details of the work because they are too numerous and because, as in every thing else, their solution will often depend more upon the judgment of the forester in charge and upon the local conditions than upon any rules that may be laid down. But whatever the problems do not let us forget that they can always best be solved by one equipped with technical knowledge and experience and that the trees are worth the effort since they are always valued by the citizen and ultimately lead to a better appreciation of the parks themselves.

EDITORIAL

THE FOREST FIRE SEASON

THE season of greatest danger from forest fires is drawing to a close. For the next six months we may breathe a little easier and if we are well advised we shall profit by experience and consider wherein our defences have been found to be lacking and provide for greater safety next year. With this thought in mind, we are publishing this month several practical articles dealing with systems of fire protection, especially in the national forests. We in the United States are not doing a fraction of what we ought to do to prevent and control forest fires. But we are doing much and doing it well, and we shall doubtless improve both the quality and quantity of our work each year now that we have really taken the problem into serious consideration.

Fortunately, not every year do we have such terrible spectacular conflagrations as aroused the whole country in 1910. But the loss each year, and especially during such dry seasons as we have been having for several years past, is heavy; the liability to outbreaks like that of last year is always present; and the time to provide for them is before they happen. That there have always been forest fires is shown by the testimony of the ancient forests, but it is unavoidable that the increase of population, the spread of human activities into the forests, should increase the danger far beyond natural conditions. And the loss becomes more serious as the forest area decreases and the size and value of our timber trees becomes less.

As was pointed out by Dr. Deckert, the German observer, in an article, the translation of which was published in this magazine a few months ago, the forest fire problem in the United States presents peculiar difficulties and will probably always remain with us as a present danger. Nevertheless, we cannot admit that American skill, energy and ingenuity are not equal to the task of reducing the danger and the loss to a comfortable minimum. The problems of organization, method and equipment have been taken up on a tremendous scale by the United States Forest Service on the national forests, and by many of the states in their own territory. Large timberland owners in the northwest and northeast are co-operating with the government officials in a way most promising of results. When we have developed a sufficient leadership of capable fire chiefs, supported by a body of trained men, with an ample equipment of the best tools, machinery and vehicles for reaching and fighting forest fires; when all our forest regions are so laced with roads and trails that fires can be reached promptly and with the smallest expenditure of energy; when lookouts with range finders and telephone connections are generally installed and experienced patrols maintained, so that fires may be detected in their incipiency; when finally—though it may well stand first in importance—the people as a whole have been educated to a sense of individual responsibility for preventing the start or spread of damaging fires, we may expect the holding of forest property to be a much less anxious owner-

ship than it now is, and forest conservation will receive one of the greatest encouragements that can be given it.

This is not a Utopian program. All of its elements are now in hand, and steady and persistent efforts will accomplish the complete result, even in the face of national carelessness and individual irresponsibility.

NEW ENGLAND'S HOPE DEFERRED

NEW ENGLAND is deeply and unpleasantly stirred by the failure of the Weeks law to accomplish any immediate results in the protection of the White Mountain forests, and especially by the possibility which has assumed alarming proportions that relief may be impossible under the law as it now stands. The state of feeling will surely become visible and audible when the people of that section generally become aware of the facts which are now known to comparatively few. A common impression still is that a law has been passed and anxiety may now be laid aside. That is a customary American attitude.

It is generally known that the first direct proposal to purchase forests in the northern and southern Appalachians was sidetracked by an opinion of the judiciary committee of the House of Representatives that such a purchase would be unconstitutional, but that forests might be purchased on the watersheds of navigable streams if it could be shown that the maintenance of these forests was necessary to protect or promote the navigability of such streams. It is needless here to discuss the merits of this opinion. Its validity as a final judgment is very doubtful. On this point constitutional lawyers differ widely. It was maintained by some strict constructionist lawyers on the committee and outside of it with entire sincerity. It also furnished a good instrument to use with less sincerity in the sharp political game which was played in the House to kill the measure.

The Weeks bill was constructed to meet this view, for so close was the fight in the House that it was useless to go against the judiciary committee. In order to further meet the views of many members who did not know just where they stood, it was provided in the bill that the Geological Survey should pass upon lands, the purchase of which was proposed, reporting as to their relation to the navigability of the streams upon whose watersheds they lie. It may easily be understood that the Survey did not care to be drawn into a matter which had already involved the foresters, the engineers, and the Weather Bureau in endless warfare, but the task was reluctantly assumed in obedience to the will of Congress.

The practical result is that while the experts of the Survey admit the serious menace of the destruction that is being done in the White Mountains and that this ought to be checked, they could not, according to the last information available, by the method of investigation which they have adopted, connect it with the navigability of the streams heading in those mountains, and there is at present reason to expect a report unfavorable, or only partially favorable on the White Mountain watersheds. The position taken by the Survey is understood to be that the relation of each watershed must be determined by direct examination of that watershed—that no other factors are of scientific value and that what has happened on other watersheds in other parts of the world cannot be used to forecast what will happen here. On this ground it must be admitted that the White Mountains stand small chance. The ultimate results of progressive denudation and of the cutting of hard-

wood are only beginning to show themselves, for the lumbering of the past will cut a small figure compared with that of the next twenty-five years, and the final consequences must, we hold, be judged with this in mind and by comparison with the ultimate effect of similar causes on other watersheds the world over.

Certain fundamental facts are regarded by the best expert opinion in New England as having a direct bearing upon the case, quite as significant as anything that can be determined from local examination of soil and topography. The first of these is the general agreement, both in Europe and America, that forests protect the run-off of streams and that on steep mountain slopes this protection is greater than elsewhere. Furthermore, it may be accepted as an axiom that the destructive agencies of nature, frost, moisture and wind, combined with gravitation, are at work in the White Mountains as in all other mountains of the world. It is further well known to local students of the question that the danger of denudation in the White Mountains is greater than in many other mountain regions because of the extraordinary growth of the paper and pulp industries that consume its principal species, spruce and fir. These grow in nearly pure stands on the high slopes. Added to this is the fact that owing to the exhaustion of the hardwood supply in some other parts of the country, the cutting of hardwood on an extensive scale has begun in the White Mountains. Hitherto many of the slopes have been protected by the hardwoods.

Fire, following cutting, has a serious effect upon the thin soil of the White Mountain country. It has rendered large areas in the White Mountains permanently barren and has set back for years the productivity of others.

It is common observation among woodsmen in the White Mountains that the spring run-off is earlier and more rapid from cut-over and burned over areas than from those not cut over. Many small streams once running free the year around have become permanently dry or mere courses for spring freshets, this being noticeable in areas that have been cut-over.

In view of these facts it seems inconceivable that the consequences which have followed such conditions in other mountain countries should not follow them in the White Mountains. And if this is true, the protection which the White Mountain forests afford to the rivers of New England is plain, and their preservation would certainly come within the scope of the Weeks law. If the experience of other countries, France, Spain, China and Syria, for example, does not furnish an analogy by which we may profit, it seems to us that it is incumbent upon those who deny that analogy to show the reason why. Thus far no proof has been offered—only denials.

It seems necessary to again emphasize the fact that whatever protection can be afforded to these New England forests must be afforded soon. Otherwise the combination of natural and human forces to which we have referred will place these hills beyond successful maintenance except as stone quarries. From the beginning of the agitation for the Southern Appalachian forests in 1899, the first support of which came from New England, New England has loyally supported the interests of the whole Appalachian region in this long struggle. To the people of this section the great human interests involved far transcend questions of bare scientific fact or abstract legal considerations. The passage of the Weeks law was hailed as the accomplishment of a great result. Its failure will be regarded with a disappointment which can hardly be described. The country has expressed its will that the mountain forests of the east should be preserved and maintained in perpetuity. That will must not be nullified.

FEDERAL TROOPS AND FOREST FIRES

THE advantages accruing from the use of federal troops in fighting forest fires in the national forests are very ably brought out by Mr. Cornwall in his article which appears in this issue of AMERICAN FORESTRY. In a time of extreme danger and national disaster, such as existed in the forests of the west last year, the troops were a great help, and the War Department would no doubt be glad to help the Forest Service again if similar emergencies arise. The use of troops in times of emergency has occurred on several occasions, as during the San Francisco fire, and a precedent may be said to have been established.

While these extraordinary situations justify the use of national troops, there is ground for diversity of opinion regarding the regular assignment of troops to assist the Forest Service. It is pointed out that such a course would tend to hamper the development of the national forest organization and build up a system similar to that in the national parks. Such a result would obviously hinder the best use of the forest. The Forest Service already has a strong organization which combines fire protection and control with various other duties which are essential to the best management of the forest. The ranger force is inadequate in numbers, but it is trained to great efficiency. In times of fire danger, the resources of the Forest Service are augmented by men and tools from local residents, lumber camps, etc., and gradually a strong reserve is being built up with the regular forest force as a nucleus. It will soon be only in times of great fire danger such as last year that inexperienced men not on the reserve list will need to be recruited, or the regular troops called out.

A system under which the Army regularly helps the Forest Service protect the forests in Secretary Stimson's opinion would be bad. It is conceded that our army needs centralizing to permit of manoeuvers by large bodies of troops. To this end it is the aim of the department to abandon small isolated posts, but this would be impossible if the troops were distributed over the national forests. Another point is that fire prevention rather than fire fighting is the essential feature of an effective system and to assign privates in the regular army to patrol work would largely deprive them of true military training and not make for army efficiency.

The German forests are protected without the help of the large German standing army and we should consider well before breaking up our small army for regular forest fire duty. When emergencies arise, the troops can be called on and their services will be most helpful, but it will be a radical and perhaps dangerous policy to put even a small proportion of our army permanently into the national forests.

MAINE'S EXHAUSTED FIRE FUND

MAINE has for some time been held up as an example among the eastern states for its system of forest fire prevention and control. Its expenditures have been considerable and it easily secured the maximum allowance of ten thousand dollars from the national co-operative fund provided by the Weeks law. It was, therefore, something of a shock as well as a surprise to learn on or about the 10th of August that the $68,000 protection fund of the Maine forestry district and the national appropriation of $10,000 were

exhausted, and that two hundred patrolmen guarding lands assessed at $45,000,000 had been laid off.

In a letter calling attention to existing conditions one paper manufacturer who had eleven thousand acres of timber growing which he had been handling conservatively is quoted as saying that he did not propose to hold timber land just to have the timber burned from lack of protection.

It is apparent that the exhaustion so early in the season of so large a fund, larger than has hitherto been available, calls for explanation. If the national government is to assist in this work it must know that the money is wisely and economically expended and that it is not wasted in a futile effort that will be practically suspended at a critical time.

Commissioner Mace issued a statement on the 19th of August in which he said that the situation was kept well in hand until the third and fourth of July, when the extraordinary conditions produced by and following the hot wave brought disaster. The statement continues:

> "Realizing the danger the patrol force was increased and the already efficient patrol was, in some case, doubled. Nothing in the line of prevention was lacking and notwithstanding the department had retained the best men who had followed the work in former years, the worst fires occurred in the sections controlled and looked after by the men who had been connected with the State's forest service since 1903 when the first law was put into effect.
>
> "The disaster was no fault, however, of the men, as the best service cannot cope against the elements which were decidedly against all that was being done, the cause assigned to some of the worst fires being lightning. It is hard to make many believe that forest fires are caused from such a source but there is plenty of evidence in the recent fires that lightning was the cause.
>
> "The extremely hot weather, and the winds on some of the days the fires were at their height, drove the flames and sparks in all directions, causing many fires at the same time. Hundreds of men were called on and responded making an expense of from $2,000 to $3,000 a day continuing at this rate from 10 to 15 days.
>
> "It was this immense expense covering the cost of fighting the fire added already to the unusually large force of patrolmen that so quickly exhausted the funds."

It is further stated that the expenses up to July 1 were unusually large, but "that with any kind of average weather and conditions the forest protection work could be carried on until the end of the season." In view of the statements quoted we are surprised to find the commissioner estimating the damage caused by the fires at only $200,000, a much lower figure than others have estimated and one hardly consistent with his description of the magnitude of the fires.

Two points are suggested by consideration of the situation in Maine. The first is that Maine has not yet placed its forest commissionership outside of politics, a thing which must be done to secure a permanently capable administration. The second is that with this vast forest interest to protect the state, if it can be shown that the present expenditure has been well administered and the fund was really inadequate, should provide an emergency fund that could be drawn upon whenever extraordinary conditions, such as are claimed by Commissioner Mace to have arisen this year, occur, to the end that vigilance need not be relaxed during the whole period of fire danger. This is a vital matter in which no state can afford to be niggardly.

EDUCATION

Yale's New Professorship of Lumbering

R. C. Bryant, professor of lumbering in the Yale Forest School (this is the new professorship endowed by the lumbermen of the country at the instance of the National Lumber Manufacturers' Association) has issued a statement describing with much detail the course in his department. He says:

The instruction in lumbering proper is conducted by a lecture course for senior students given in New Haven from October 1 to March 1, and by practical field work in the South from March to the middle of June.

INSTRUCTION IN NEW HAVEN

The lecture course in New Haven is designed to give the student a clear idea of the general principles underlying the conduct of the lumber industry in the United States and a general understanding of economic subjects related to it. This lecture course is given four times a week during the fall and winter terms. The following subjects are among those covered:

1. Importance of the industry in the United States, brief historical review of its development, statistics of the industry, the future of the industry.

2. Planning a logging operation, methods employed, data required, and methods of obtaining it.

3. A comparative study of the methods of, and equipment required for, logging operations in the various forest regions. This covers all sorts of tools, vehicles, and machinery used in handling logs from the stump to the railroad or water.

4. Transportation of timber and other forest products by land and water. Methods, equipment required, value of each system.

5. Detailed study of logging methods in specific regions.

6. Log scales, scaling practice, and log grades used in different regions.

7. Types of manufacturing plants and equipment used.

8. Methods of manufacture.

9. Theory and methods of seasoning lumber.

10. Preparation of lumber for market in planing mills.

11. Methods of sale—trade customs.

12. Lumber grades and grading methods.

13. Lumber associations—objects and work.

14. Foreign and domestic markets.

15. Timber bonds.

16. Insurance for sawmill plants and timber.

17. Lumber tariff.

18. Cost-keeping methods.

19. A brief course treating of shingle, lath, clapboard, veneer, cooperage, vehicle stock, boxboard, excelsior, and charcoal manufacture, and the harvesting of tanbarks and turpentine orcharding follows.

The lecture work is supplemented and illustrated whenever possible with models, drawings, lantern slides, photographs, and other material that will more clearly illustrate the subject matter.

Professor Bryant's statement then calls attention to the close relation to training in lumbering of the instruction given by other members of the faculty, describing briefly the courses in land surveys and map making, forest law, wood technology, forest management, forest mensuration, construction engineering, silviculture, entomology, and diseases of trees.

The field work of the spring term of the senior year, which has since 1906 been spent on some large lumber operation is described at length. The camp and field work are in charge of Professors Chapman and Bryant. The statement continues:

The instruction given consists very largely of field work, supplemented by the few lectures necessary to properly explain the work in hand. The instruction covers the following points:

LOGGING METHODS

A detailed study of all phases of the logging operation of the company is made. This includes:

1. The methods of planning the logging operation.

2. The organization of the woods, labor and wages paid.

3. Railroad location and construction. Practice is given in laying out logging railroads and spurs on lands where the company will soon operate. The method and cost of railroad construction are studied first hand with the logging company's crew.

4. Felling methods and tools—Saw filing and care of tools. Daily output per crew and cost.

5. Skidding and hauling methods—where more than one system is used a comparative study of the efficiency of each is made

NEAR VIEW OF GENERAL ASSEMBLY AND SMALLER TENTS

INTERIOR OF INDIVIDUAL TENTS, EACH 10x12 AND COMFORTABLY EQUIPPED

GENERAL VIEW OF CAMP FROM THE EAST. BEHIND STOOD A HEAVY FOREST OF BEECH, BIRCH, SUGAR MAPLE, AND WHITE PINE

MICHIGAN AGRICULTURAL COLLEGE CAMP

STUDENTS IN ASSEMBLY TENT EXAMINING ENTOMOLOGICAL MATERIAL

STUDENTS OF THE SUMMER SCHOOL. THEY HAVE COMPLETED THEIR SOPHOMORE YEAR. TWO OCCUPY A TENT AND EACH TENT MAKES A WORKING CREW WITH OUTFIT

THE EVENING HOUR OF RELAXATION BEFORE THE CAMP FIRE

MICHIGAN AGRICULTURAL COLLEGE CAMP

and tables prepared showing the amount of work performed in a given time under given conditions. A knowledge of the ability of men and animals under specified conditions furnishes a basis for the determination of their efficiency under other conditions. Costs per unit.

6. Railroad operation, log loading, train operation, unloading at mill pond, etc.; methods and cost.

7. Study of waste in logging incident to careless felling, high stumps, improperly cut log lengths, etc. How to determine actual waste and financial loss to the lumberman.

8. Efficiency in management.

9. Log scales and practice in log scaling.

10. Relocation of old land lines. Each student is given several days' work, under a skilled surveyor, in the relocation of old land lines to bring out difficulties attending this class of work and the necessity of great accuracy.

11. Topographic mapping. Considerable practice is given in the collection of data for and the preparation of a topographic map of a tract of 25,000 to 30,000 acres for logging purposes. The training aims at securing speed in the collection of data combined with sufficient accuracy for logging purposes.

12. Extensive practice is given in the various methods of estimating timber by ocular methods, and the principles underlying them.

13. Practice in marking timber for a second cut.

14. Studies of the rate of growth and preparation of a plan of management for yellow pine and other forests.

MANUFACTURE OF LUMBER

The students are divided into three groups and each group spends two weeks at the sawmill plant becoming familiar with the manufacture of lumber. Among the points covered are the following:

1. Character and equipment of the manufacturing plant.

2. Methods of manufacture.

3. Methods of seasoning lumber.

4. Planing mill equipment and dressing of lumber.

5. Practice in grading rough and finished lumber.

6. Study of defects in logs and their influence on the quantity and quality of lumber produced.

7. Labor organization of plant.

8. Organization and management of shipping department.

9. Markets and prices.

10. Waste in manufacture and possible remedies.

11. General efficiency of operation, improvements possible.

The results of the study of logging and manufacturing methods are embodied in a report which forms the basis of criticism for the student's work and corrects any erroneous impressions that may have been formed during the study.

The object of the spring work is to bring the student into close contact with operations in the field, give him training in the performance of forest work, and to permit him to put into practice the knowledge gained during his attendance at the Forest School. He gains confidence in his ability to do things correctly and it provides an excellent foundation on which to build his future practical career.

A Forest School, and any other technical school, cannot turn out graduates fitted on graduation to assume responsible positions unless they have had previous practical training. The latter is a most essential factor in any technical profession. A technical training, however, does give a foundation on which a man may build to good advantage and which will enable him to become a more proficient practical man in a much shorter time than would be possible had he not had his technical training.

The lumber industry in the past has demanded a man skilled in many different lines, especially in engineering. The industry in the future will demand still more of the man who will be successful because he will be called upon to handle his product very closely, find new uses for his present waste products, plan for future crops of timber, and to practice forestry of a more or less intensive nature. In this work the technically trained forester will be invaluable to the lumberman.

Michigan Agricultural College Forestry Department Summer Term

The third session of the summer term of forestry given by the forestry department of the Michigan Agricultural College, was held on the estate of David Ward, Deward, Crawford county, Michigan, from June 21st to August 10th, 1911.

There were twenty-four students in attendance and four courses were given—one in civil engineering, which took up land plotting and rapid topographical mapping; one in entomology which consisted in the identification of forestry insects and a study of their life history; one in field methods which treated of the necessary equipment and maintenance supplies for men and horses in the field. In the last of these students were given practical work by being fully equipped for field expeditions and being sent out with their entire equipment packed on their backs, making camp and cooking for themselves. There was also a course in forest mensuration which consisted of making volume tables, height diameter tables, form factor tables for white pine, hemlock, sugar maple, and beech, laying out a plot of ten acres, cruis-

ing the same after handing in estimates, carefully going over the plot and measuring each tree on the plot and calculating the volume by different methods. As soon as this work was completed choppers felled the timber on the area and timber was measured and checks made on estimates and calculations. Practice was also given in cruising forty acre plots and 160 acre plots by the different methods. Much practice was also obtained in locating witness trees and boundary lines. Students had the opportunity to appreciate the extent of an area of 640 acres of heavily timbered stand.

The camp was located on the shores of Sand Lake, adjacent to the estate logging camp No. 18 which is operating in white pine with 110 men and 15 teams.

The students were housed in tents about five minutes' walk from the cook shanty of the main logging camp. There were ten tents 10x12, set at an angle of fifty degrees with the main assembly tent which was 23½ by 41 feet. All of these tents were equipped with a board floor. The individual tents, housing two students, were all equipped with board floors, two cots, study table, two chairs, lantern and lamp. Oil and matches were furnished. A yard man was employed to sweep the tents, fill the lanterns and lamps, fill the water pails each day, pick up about the camp and accumulate wood for the evening's bon-fire.

The hours kept by the students were the same as those kept by the logging crew, beginning with breakfast at five o'clock. Boats, guns and ammunition were furnished for the use of the students. A target range was laid out and records kept of the practice.

Dr. R. C. Allen, State Geologist of Michigan, was in camp and gave a series of lectures on topographical maps and mapping. Mr. R. S. Kellogg gave a series of lectures on general forestry topics.

The pictures reproduced on other pages give a good idea of the life of the school in camp.

University of Vermont

The University of Vermont is to be added to the list of those institutions giving instruction in forestry. A course in forestry is one of the regular courses in the Department of Agriculture. The plan common to many schools of agriculture of making the work of all courses identical the first two years is followed here. In last two years these courses are differentiated and the specialized subjects taken up. In the two years in which time is given to forestry studies it is intended to train students for Vermont forestry in connection with and not apart from agriculture and to prepare for the graduate forest schools those who may intend to enter professional forestry. The special forestry training covers such subjects as dendrology, mensuration, technology, silviculture, and management; certain phases of botany are taught with a strong slant towards forestry; special engineering courses having forestry adaptations are offered; and two summer schools, one in forest engineering and one in forest management, wherein forest students spend a month each summer are held.

Iowa State College

Mr. Nelson C. Brown, deputy supervisor on the Kaniksu National Forest, in Idaho, has accepted the position of assistant professor of forestry at the Iowa State College, at Ames. Mr. Brown received his collegiate training at Yale, graduating in 1906. He immediately took up graduate work in the Yale Forest School and in 1908 received the degree of master of forestry. Since that time Mr. Brown has had wide experience in forestry work both in the east and in the west. His training and experience together with his instructional work in the Yale Summer Forest School, make him amply fitted for the work in his new field.

New York State Forest School

New York is again to have a State forest school. This time it is to be established in connection with Syracuse University. Residents of New York state for one year prior to matriculation will receive free tuition. The earlier New York forest school at Cornell, under Dr. B. E. Fernow's able direction achieved a high standard and graduated many good men. The regrettable discussion over the management of state forest lands is fast passing into ancient history, yet it is only a few years since it made a very stirring and angry note in the forestry world. It involved the school in the meshes of politics and the state withdrew its support, compelling Cornell to discontinue the school. Every honest and fair-minded man who knew the circumstances deplored the result, which ultimately lost to this country one of its ablest teachers of forestry in Dr. Fernow. It is much to be hoped that the new school will escape such pit-falls and work out a career of great usefulness.

NATIONAL FOREST WORK

An Official Account of the San Bernardino Fire

In view of the many conflicting newspaper reports on the recent San Bernardino fire, District Forester Coert DuBois, who is in general charge of the national forests in California, has issued the following authentic account:

The fire started about noon on Tuesday, July 25, from an unknown cause, on the west side of the road up Waterman Canyon. Within an hour and a half, three forest rangers and seven citizens had reached the ground and brought the original fire under control with less than two and a half acres burned over. A separate fire, starting from a brand, blown from the main fire, had also been detected and extinguished. Another spark had evidently jumped across the road from the original fire when it was burning its hardest. This spark smoldered but did not show up in flame or smoke until some fifteen minutes after the first two fires had been brought under perfect control. The ten men on the ground attacked this third fire promptly and except for the high wind then blowing, they would have had no difficulty in conquering it.

Cases are very rare where fires escape from control after being reached by the rangers as promptly as this San Bernardino fire. When the rangers and fire fighters had this third fire almost under control, a furious gust of wind came up the canyon, scattered fire all over the hillside from the one-half acre, then burning, and forced the men to run for their lives. Except for this extraordinary wind, which eye witnesses say was a small hurricane, the fire would never have escaped and would have represented little more than a figure in annual fire reports and other statistics.

After the fire escaped, it burned with untrollable force during the remainder of the afternoon and covered over 500 acres by 6 o'clock Tuesday evening. Realizing that help was needed immediately, the ranger in charge when the fire escaped promptly telephoned to San Bernardino for men. Right here the protective system broke down. Naturally no forest officer was in San Bernardino and no arrangements had been made in advance for the immediate dispatch of volunteer fire fighters or organized bodies of men in case of fire. The men telephoned for by the ranger were not sent. The small force of men on the ground fought without help twenty-one hours, or until 11 o'clock on Wednesday, July 26. Recognizing the hopelessness of the situation, two rangers then left the fire line and went to San Bernardino for men. The opportunity to conquer the fire had, however, been lost for lack of help during the first twenty-four hours. During the second and third days of the fire rangers and fire fighters labored unceasingly to control the blaze. They succeeded except in the head of a fork of Cold Water Canyon where the fire was burning fiercely on very steep ground covered with a dense growth of manzanita and thorn brush and where there was very little dirt to use in fighting the flames. Forest officers and fire fighters who have been over this ground report that the difficulties confronting the fire fighters at this point cannot be understood by anyone who has not actually been over the ground. Friday night, when the fire had been burning for a trifle over three days, a fire line was almost completed around the lower end and sides of the fire. Before the circle could be closed, a high north wind started to blow and scattered fire in new directions, undoing much that had been gained during the previous day's fight. The north wind blew for only two hours, but in this time fire was so scattered that when the normal southwest wind again started up, the fire was able to spread rapidly, despite the desperate efforts of the hundreds of men then on the line. North winds blew again at intervals during Saturday night, Sunday and Sunday night. Each time the north wind blew, the fire was blown backward into positions from which, when the southwest winds returned, it could make uncontrollable rushes up the steep front of the San Bernardino range. By Sunday night the fire had spread to such size that the task of working the enormous length of the fire line was not completed until Monday, August 7, almost two weeks after the fire started.

When the fire started, Mr. R. H. Charlton, the supervisor of the Angeles National Forest, was on one of his regular trips of inspection and field supervision. He promptly got in touch with his subordinates who were in charge of the fight, but since they repeatedly reported that they expected no difficulty in conquering the fire, Mr. Charlton did not leave his regular work for

several days. Deputy Supervisor Long was in Los Angeles in charge of the supervisor's office when the fire occurred. When the fire had been burning twenty-eight hours he realized that the situation was grave enough to demand his personal attention and immediately started for San Bernardino to take personal charge of the work.

The organization of the fight at this fire was about the same as usually effected when large stubborn fires are being fought. On occasions of this kind, red tape is never a bar to prompt and effective action. At this fire men were employed, supplies purchased, and every sort of transportation arranged for both men and supplies without the delay of any system of requisitions or approval of higher officers of the service. The standing instructions to supervisors and rangers are to incur any liabilities necessary for the controlling of any fire on national forest lands. At no time in the history of the San Bernardino fire was there any hesitation in securing men or supplies because of the expense or lack of authority of men on the ground to incur it.

A peculiar feature of this fire was the opportunity to use automobiles in transporting men and equipment. This very successful mode of transportation was used wherever necessary. The camps were kept well supplied with provisions and men went hungry only when they were unable to get to the camps.

Although no preparations had been made for the employment of such large bodies of men, numerous ingenious systems of organizing small crews, issuing and dispatching orders and handling men at camps were devised and adopted, notwithstanding the strain of the fight.

Men were employed at the standard rate of pay for this part of the country. Twenty-five cents per hour was allowed for time consumed going from San Bernardino to the fire, for all time spent on the fire line or in traveling between the fire camps and the fire line, and also for returning from the fire to San Bernardino. The statement that straight time was allowed at 25 cents per hour from the start from San Bernardino until the return was unauthorized and did not originate with any forest officer. It is obvious that the standard forest service system of paying fire fighters by the hour would be nonsensical if payment were to be made for twenty-four hours a day.

Back-firing, when possible to practice it, is one of the most effective methods for fighting forest fires. This system was used whenever conditions of wind and slope made it safe, and miles of back-fires were set under the instructions of forest officers. Back-fires are exceedingly dangerous weapons, however, and when indiscriminately or unintelligently used, are certain to spread the fire instead of aiding in its control. One of the most serious handicaps the forest officers had to contend with was the setting of unauthorized back-fires by settlers who wanted to protect their own property but failed to take precautions against spread of the fires they had set.

Instructions against back-firing were usually respected by settlers and threats to use fire arms were not necessary and were not at any time resorted to. Some disastrous back-fires were set when no forest officers were near to prevent it. One sawmill man back-fired around his property although he was not in the path of the main fire. He then started up his mill in disregard of possible damage his back-fire might do to others. Forest officers and fire fighters had to leave their work on the main fire to fight this back-fire but before they succeeded in bringing it under control it had, on account of the high wind prevailing at that time, run over two miles and joined the main fire.

On August 3, while the San Bernardino fire was still at its height, a disbursing agent was sent from San Francisco with a large sum of money to his credit in the United States subtreasury. He arrived in San Bernardino on the morning of August 4. Only straggling fire fighters were then in town awaiting payment and it was not until the night of August 5 that a forest officer could be spared from the line to come into town and approve the time checks of the fighters. The disbursing agent started writing checks on the morning of August 6 and kept it up until August 13, at which time he had paid all of the labor accounts except a few odd bills that had not been presented. Settlements of fire accounts in this case, as in all others, take precedence over all other bills.

The total cost of controlling the fire was in the neighborhood of $25,000, practically all of which was paid by the forest service. The total area burned over is a trifle under 19,000 acres. Two-thirds of this area is devoid of timber but was covered with a growth of brush of very great value to the water-using industries of the San Bernardino Valley. The damage to timber is less than would be expected—not over five per cent of the mature timber and only half of the young timber between ten years of age and maturity being killed. Seedlings under ten years of age were, of course, consumed.

An investigation will be made to determine the best method of repairing the damage to the watersheds burned over, but as yet no plans have been made for planting the denuded hillsides.

At several different times, officers in charge of the fight, as well as mountaineers who have had life-long experience at the fire-fighting game, believed they were nearing the end of the fight. That their expectations of success were not realized was due to the freakish winds. The judgment

of forest officers is only human and all experienced fire fighters recognize the difficulty of contending with high winds or forecasting the outcome of efforts to control a fire when a strong wind is blowing. Every specific charge against the men in charge of the fight has been carefully investigated by an officer from the San Francisco headquarters, and they have been entirely cleared of any suspicion of inefficiency.

Supervisor Charlton and Deputy Supervisor Long have had years of experience in fighting brush fires. They have been particularly successful in keeping fires out of the forest under their charge. Last year the Angeles' record for prevention and prompt control of fire was the best in District 5, comprising California and Western Nevada.

Causes beyond the control of these men or the rangers who assisted them were alone responsible for the failure to extinguish this fire in its early stages.

As soon as it was found that there was no possibility of ordering out troops (the authority for which was requested by the district office), emergency bodies of fire fighters, each 20 to 25 strong, were assembled at Bakersfield and at Bishop and held "under arms" for two days. Luckily these were not needed, but if the need had arisen at least 100 men under the leadership of six experienced fire-fighting rangers could have been rushed to the scene from nearby forests.

The people and commercial organizations of San Bernardino, Redlands, and Riverside gave splendid cooperation in bringing this fire under control. They are entitled to the sincere thanks of the department and the people of Southern California who are benefited by the protection of the San Bernardino mountain range.

A number of valuable lessons can be learned from this fire. A study of its history indicates the need, first of all, of closer cooperation between the people of southern California and the Forest Service. If citizens and employers of labor will organize themselves into protective associations and agree in advance to send help immediately on receipt of notice that help is needed on a fire, assurance can be given that the history of the San Bernardino conflagration will not be repeated. The construction of trails, fire lines, the purchase and storing of tools and other equipment at strategic points, the employment of additional patrolmen—all these measures will help, but the appropriations made by Congress are not large enough to do everything at once that should be done. The people of southern California must cooperate even more liberally than they have in the past if fire is to be kept out of the mountain ranges.

August 26, 1911.

A Government Timber Sale and Its Conditions

The Department of Agriculture and the Department of the Interior have just concluded arrangements that will probably lead to the largest timber sale ever undertaken by the Government. The tract to be lumbered is in the eastern part of Arizona and comprises a large portion of the Sitgreaves and Apache National Forests and a part of the Fort Apache Indian Reservation. The total area to be lumbered is about 200,000 acres, and contains approximately 600,000,000 board feet of merchantable timber.

Application for this stumpage has been made by the Navajo Development Company, a corporation chartered under the laws of Arizona, and a careful examination of the area has been completed by representatives of the company and of the Forest Service and the Indian Office. This does not mean that the development company will secure the stumpage unless its bid is the highest, because, under government regulations, the timber will be sold to the highest bidder. But the fact that the company has made application warrants the placing of the material upon the market.

Nine-tenths of the timber, or approximately 575,000,000 board feet, is western yellow pine, which possesses many of the excellent qualities of the white pine of the Northwestern and Lake States. The lumber manufactured from it combines lightness with strength and easy-working qualities; the best grades are made into finishing stock, flooring and ceiling, and sashes and doors. The clear material is highly prized by pattern makers, and one manufacturer of this wood sells his entire output to a transcontinental railway line for use in making patterns in its shops.

The timber next in importance on this area is Douglas fir, of which there are 15,000,000 board feet. This wood is excellent for mine and other timbers, and some railroads pay a higher price for Douglas fir ties than for those made from other kinds of trees, because they last much longer when in contact with the ground. The rest of the merchantable material is made up of white fir, Engelmann spruce, Mexican white pine, blue spruce, and corkbark fir.

The timber is located about 60 miles south of Holbrook, Arizona, the county seat of Navajo county, which is on the main line of the Atchison, Topeka and Santa Fe Railroad. From Holbrook a railroad can be built south to the timber, and will pass through a region where there are several small towns and much agricultural land which can be irrigated. The full cost of railroad construction will not have to come out of the investment for developing the

timber, because the road can be made a common carrier and many thousand tons of freight now handled by slow and cumbersome freight wagons could be hauled each year on the new line; also large quantities of hay, grain, and other supplies are used at Fort Apache, an important military post about twenty miles south of the tract. In addition to this, some revenue should be derived from passenger traffic, not only from civilian travel but from the movement of troops to and from Fort Apache, and there should also be a good income from mail contracts.

Deposits of coal said to be of excellent coking quality are within thirty miles of the timber, and the development of these deposits only awaits railroad transportation.

In order to secure immediate development of this timber resource and at the same time to protect the purchasers of the stumpage in their investment and give them sufficient time to make the cutting, the government has set a limit of ten years from the completion of the logging plant in which the whole 600,000,000 feet of lumber must be harvested. Two years will be allowed for the preliminary work, such as building sawmills, quarters for the lumber crews, logging railroads, and spurs.

While the Navajo Development Company makes the application for this timber, it will be advertised in the open market for 120 days, and the timber will be sold to the highest bidder in accordance with the regulations prescribed for the sale. No price will be considered less than $2.50 per thousand board feet for the timber cut during the first five years of the contracts and $3 for that cut during the last five years. During the first two years of the contracts, which will be separate for the national forest timber, under jurisdiction of the Forest Service of the Department of Agriculture, and the Indian Reservation timber, under the Indian Office of the Department of the Interior, the successful bidder will be required to cut 35,000,000 board feet under each contract. Each year after this, however, he will be required to cut not less than 25,000,000 board feet under each contract.

There are several special provisions of interest which provide for full utilization of all the available material: The sale includes two-thirds of the live timber and the merchantable dead timber; no unnecessary damage shall be done to the young growth nor to trees left standing for seed; stumps must be cut low and trees utilized well into the tops; brush will be disposed of by the purchaser; all felling and cutting into log lengths will be done with a saw instead of an ax, to avoid the waste in ax chips. Strict precautions will be observed for protection against fire, and railroads and logging engines will have to use oil or electricity. The use of oil is thoroughly practicable, as it can be obtained cheaply and conveniently. The main line of the Santa Fe, only a few miles away, uses this fuel, and it is used also in lumbering operations on the neighboring national forest, the Coconino.

Altogether, this timber sale should prove an attractive proposition, since the tract contains what is probably the largest body of good timber now remaining in the Southwest. It is not in rough country, but on an extensive plateau where the ground is either smooth and level or gently undulating. The region is well watered and presents almost ideal logging conditions. Not only should it be attractive from the point of view of the lumberman but from that of persons who are interested in opening up and developing a comparatively new region. The country has needed only the railroad facilities which will be offered by the road from Holbrook south to make rapid strides. Even at the present time tens of thousands of cattle, sheep, and horses graze in the region, yet all beef and mutton must be driven on the hoof to Holbrook and wool has to be freighted by wagon from distances varying from 30 to 100 miles. In addition to the timber directly involved in this sale, other large bodies aggregating about 1,500,000,000 board feet will be made accessible by the proposed railroad.

District Forester Silcox at Missoula, Montana, has just sold a total of 125,000,000 feet of fire-killed timber, presumably a part of the timber killed in the great fires of 1910.

The Forest Service has been making energetic efforts to dispose of this fire-killed timber before it should become a total loss, and has made a number of sales but none of equal magnitude with those now announced. The sales are of 50,000,000 feet to the McGoldrick Lumber Company of Spokane, and 75,000,000 feet to the Roselake Lumber Company of Roselake, Idaho.

Ordinarily such large sales are made from Washington, with full reports on file, but in this case special authority was given to the district forester to close contracts at once. There is still a great deal of fire-killed timber in the northwest which is for sale on very reasonable terms, and as a result of field studies of its amount and the natural conditions the Forest Service is prepared to furnish full information to prospective purchasers concerning the location of bodies of timber and the logging methods which will be necessary in each case.

The Use of Odd Lengths

The investigation carried on last year by the United States Forest Service, cooperating with lumber manufacturers in the south, to determine the saving that can be effected by using odd lengths of lumber as well as even, has begun to bear fruit. That investigation showed that a material saving was practicable, and at a recent meeting of a southern lumber manufacturers' association the fact was brought out that a beginning has been made in putting the new plan into practice, and that an increase in the sale of odd lengths is anticipated for the near future.

It was formerly the custom, and generally is so still, to sell lumber in even lengths only. Waste resulted from cutting off the ends of odd lengths to make them even. A considerable percentage of the boards in a sawmill's output have knots, decayed spots, or split ends, and the defective parts are cut out. To make an even length of what remains, it is often necessary to cut off a foot of good wood with the bad, and it is wasted. The practice of marketing odd lengths as well as even is meant to lessen this waste. The sale of odd lengths of lumber will frequently lessen waste in the woods also; for example, a log may be cut fifteen feet long which, following the old custom, would be cut only fourteen and the extra foot left in the woods.

The introduction of odd lengths meets with opposition from many builders who are prejudiced in favor of even lengths simply because they have never used any other kind. Nevertheless, there are many places in which odd lengths are more economical than even ones—for instance, where nine-foot studding is used. Following former custom, the ends must be cut from even lengths to make the timbers fit. Some manufacturers of flooring successfully sell odd and even lengths, thus lessening waste in the woods, at the mill, and in the construction of buildings.

CURRENT LITERATURE

REVIEWS

The Principles of Scientific Management. By Frederick Winslow Taylor, M. E., Sc. D., past president of the American Society of Mechanical Engineers. New York and London: Harper and Brothers, 1911. Pp. 144. Price $1.50 net.

For thirty years Mr. Taylor has been developing the theory and practice of more perfect utilization of human effort. This book sets forth the underlying principles at which he has arrived. We do not need to go into the controversy in which some of the labor unions have enrolled themselves in opposition to something which they have apparently taken too little pains to understand. Nor do we need to accept the extravagant claim, resting upon a misuse of terms, that here is the birth of a new science. What is worth noting is whether the author has any valuable ideas for the promotion of human efficiency and for doing away with much of the wasted energy and lost motion that every intelligent person knows there is in both the physical and intellectual activities of most of us. Looking at it thus, Mr. Taylor's thesis is worth careful study. It is intended presumably for the organizer and director of industry, but it may be suggestive to every worker. Scientific management will now be much in evidence before the country, in theory at least, and it behooves every one to understand its real significance. It certainly does not mean, as some have hastily assumed, making men work harder. It does mean, we take it, making men work better and hence more easily. If anything will lead to shorter hours and better pay, looking at it from the labor side, this should be the touchstone. In any aspect of the case, the leader of the new movement is entitled to his demonstration.

The Better Country. By Dana W. Bartlett. Boston: The C. M. Clark Publishing Company, 1911. Pp. 555. Price $1.50 net.

The chief value of this book is as encouragement to optimists. It is a rapid fire summary, reading almost like a catalogue, of the many things that are being done for the physical, mental and moral benefit of the people. As such it is a good antidote to the disheartening destructive criticism with which various publications have teemed for a few years. It treats of social service, raising the standard, nations at work in social uplift, wealth for all the people, conservation of the nation's resources, agriculture's opportunity, home building, enrichment of life, life saving, education, immigration, serving others, the peace movement, and the broadening of democracy. This is a wide field, covering all the great progressive activities of the people and it is almost unavoidable that such a summary should be too much of a catalogue and contain too little of the significant and useful facts about the movements to which it refers. It is a book of temporary interest and will serve to give

the reader a conspectus of the intensely active period in which we live, but it is not of permanent value and will add very little to the information of the man or woman who reads much and follows closely the course of events.

MONTHLY LIST FOR SEPTEMBER, 1911

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NEWS AND NOTES.

Lost River in New Hampshire

The Society for the Protection of New Hampshire Forests, having aided in the preservation of the top of Sunapee Mountain in that state, of which it is to receive the title from the public-spirited purchasers, is now endeavoring to preserve another of the scenic treasures of New Hampshire, the gorge of Lost River, lying in the wildly picturesque country between Mounts Moosilauke and Kinsman.

Lost River, rising on the slopes of Mount Moosilauke, runs for a mile and a half over steep cascades, then plunges underground for nearly a mile before emerging to the surface again. In its subterranean course are many large caverns and cascades. Kinsman Notch, through which the river runs, is notable for its steep wooded cliffs, the beaver meadows at the summit of the notch, and its numerous streams.

The society has voted to apply to this purpose a recent legacy of $5,000 and is trying to raise by subscription the remaining $2,000 for the purchase and $1,000 additional to be used to clear up the slash and waste timber left by lumbermen in previous years.

The Publishers' Paper Company, which owns the property, has agreed to give the society title to 148 acres, including the whole underground route of the Lost River, provided the society will pay $7,000 for the standing timber.

The Southern Pine Beetle

Professor A. D. Hopkins, of the Bureau of Entomology, has made a report upon the dying of pine timber in parts of Georgia, South Carolina, and North Carolina. He finds this due to the work of the southern pine beetle, which was found to be thriving in the bark of all the infested trees, the indications being that the beetle exists in enormous numbers. The report continues:

It has been known for more than forty years that this particular beetle has existed in the southern states, and our extensive studies of it within recent years indicate that it has occupied the region since time immemorial. It appears, however, that only at long intervals does it increase to such numbers as to cause widespread depredations, such as, for example, the great invasion of 1890-1893 in the Virginias. Under the normal conditions of its life and habits, a few scattering trees are killed by it each year in nearly every county throughout the southern states where the pine is common. If, however, there are from any cause favorable conditions for the multiplication of the insect, it is thus able to kill groups of trees, and if these groups increase in number and size the following year, they constitute the danger signal of an outbreak with resulting widespread depredations. These are just the conditions found in the localities observed, and from the reports received from different sections of the South ranging from Texas to Virginia, it is evident that they prevail throughout the greater part of at least the short-leaf pine belt. Therefore, there is every reason to believe that unless prompt and properly directed action is taken by owners of pine timber throughout the region during the coming winter, a large percentage of the best old as well as middle aged and young pine will be killed within the next two or three years.

Published information, as well as special instructions on practical methods of control, have been sent to all of our correspondents who have requested advice on the subject during the past year. Doubtless in some cases the advice as to proper methods of combating the pest has been followed, but in every case examined where some attempt had been made by the owner towards control, little or nothing had been accomplished from the fact that some of the essential details had been neglected. In most cases the dead trees had been cut after the beetles had left them and in other cases the bark from the dying infested trees had not been destroyed in time to prevent the escape of the broods of beetles. Therefore, it is evident that in order to bring about the proper general understanding and application of the most economical and effective methods of control and protection, it is necessary for the experts of this bureau to conduct some practical demonstrations in different sections of the South. With this object in view, the bureau will establish a forest insect field station at some central point in the South, where instructions can be given and where

agents and experts will be available for demonstration work.

In the meantime, every one who is interested in the protection of the pine timber land, and the prevention of the widespread destruction of the pine throughout the country should report to this bureau the location of every large patch of dying or red-topped dead timber observed between now and the first of next February.

The time to conduct the real work of control will be between the 1st of November, 1911, and the 1st of March, 1912, and concerted action in carrying out the most economical and effective methods in the affected areas in each county of the several states involved is essential to success.

The methods of control will vary somewhat in different localities and sections of the region, but briefly they are as follows:

a. The location of dying trees actually infested with the broods of the destructive insects.

b. The destruction of the broods in the bark of the main trunks of the trees. This is accomplished in many different ways, and whenever the wood can be utilized for cordwood, lumber, or other commercial purposes, the value of the product will balance the costs of treatment, and in some cases yield a profit, but to avoid serious mistakes one must know how and be sure he is right before he makes the attempt.

The advice of the experts of the bureau of entomology, United States Department of Agriculture, can be had for the asking, and personal instructions will be given and demonstrations made in sections of the several states where the greatest interest is manifested and where the best facilities are offered for rendering the service to a large number of owners.

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